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AV Communication Review

AUDIO VISUAL

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Prejudgments of Educational Television: A Study of Stereotypes

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Development of an Audience-Tailored Film

EDWARD LEVONIAN

WINTER 1960

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Editor's Foreword

IN A PERIOD OF DYNAMIC CHANGE in modern instructional technology the route that this professional journal must follow is clearly laid out. It demands an awareness of the changes that are occurring. And it requires us to stay ahead of the trend through an imaginative interpretation of these changes as they pertain to the application of new communication devices and techniques in the solution of educational problems.

Since the first issue of AV COMMUNICATION REVIEW came out seven years ago our field of interest has experienced some notable innovations. Television has established its place in instruction, language laboratories have been revived, complete courses have been recorded on motion picture film, and the teaching machine promises to take over many rote instructional activities of the teacher. The Ford Foundation has emerged as a potent force influencing the application of new technological media to education, and Congress, through the National Defense Education Act, has recognized that the AV communication tools are more than mere supplementary aids to instruction.

This issue of AV COMMUNICATION REVIEW is the first step in meeting the challenge of the changes in audiovisual communication by means of a redesigned, expanded, and more complete professional journal. Beginning with the present volume the journal will be expanded to six issues per year. Four of these will be comparable to the issue you have before you with increased coverage of the AV communication field both here and abroad, and a more extensive reporting

of research, including Title VII projects. Two of the issues will be special supplements. Each of these will be a complete issue devoted to an intensive consideration of some area of critical concern in AV communication. It is expected that these supplements will find audiences in other disciplines than our own and that they will serve to indicate the range of application of the audiovisual communication media.

The Editorial Board of AV COMMUNICATION REVIEW joins me in extending to all readers an invitation to participate in our task of continuing to develop a professional journal that will be representative of the scope of our field and that will be a really fine contribution to education. We hope that you will constantly and actively evaluate our editorial efforts in an attempt to reach this goal.

William H. Allen

Automation and Education:

III. Technology and the Instructional Process

JAMES D. FINN

James D. Finn is professor of education, University of Southern California, and president-elect of DAVI. *This paper was presented at the ASCD Seminar on a Theory of Instructional Materials in Washington, D. C., November 10-15, 1959. The Seminar was one phase of an ASCD project conducted by the U. S. Office of Education under provisions of the National Defense Education Act, Title VII, Part B. It is printed here with the permission of the Association for Supervision and Curriculum Development, NEA.*

As an instrument of work engaging human energies in a manner far surpassing the lure of war, as a social dissolvent and readjuster, and as a philosophy of action, technology must be brought into the main stream of history, if the course of history is to be surveyed correctly and 'the dark imminence of the unknown future' is to be in any way penetrated . . . Charles A. Beard (1932).

If we can grasp what John Stuart Mill called the 'principia media' of a society, if we can grasp its major trends; in brief, if we can understand the structural transformation of our epoch, we might have 'a basis for prediction.' . . . C. Wright Mills (1959).

RECENTLY, by way of the mass media, the American and, presumably, the Russian people were treated to a vigorous sporadic and, at times, heated debate between Vice President Nixon and Premier Khrushchev. The occasion, as is well known, was the opening of the American exhibition in Moscow. The strange thing about this debate was its subject. Although the discussion ranged superficially over many cold war problems, the central subject of the debate was *technology*—both directly and by implication. Mr. Nixon and Mr. Khrushchev were debating the values of American *versus* Russian technology. Mr. Khrushchev's later visit to the United States merely continued the international colloquy.

Nothing could have emphasized the interests and commitments of the modern world more clearly than this clash between statesmen of the great opposing powers. They were singing, in effect, a gigantic and possibly terrifying version of the musical comedy favorite of some years ago—"Anything you can do, I can do better." And what is to be done involves the technology of washing machines, missiles, atomic power, mass production of housing, frozen orange juice, and lunar satellites, to mention only a few items. Technology, unlimited; technology, international; technology, totally competitive—in weapons, in commerce, even in the arts.

In addition, science, technology, and invention on a large scale have become such a handmaiden of industry in the United States that research and development are now regarded as the basic keys to progress in our economy. Research lengthens our lives and, until very recently, our automobiles; it filters our water and our tobacco smoke; it weaves miracle fabrics out of chemicals and television commercials out of our suppressed desires; it shoots missiles at Venus and attempts to construct a Venus out of every American woman with the aid of brassieres designed by engineers acquainted with the latest in stress technology.

Modern historians of technology, such as Oliver (26), emphasize the fact that American civilization is fundamentally a technological civilization. It is not surprising, then, to find that at a time of international crisis occurring simultaneously with the period in history remarkable for what is now generally called the "explosion" of knowledge, Americans would take the view that further development of science and technology is our number one national objective.

Technology, however, is more than invention—more than machines. It is a process and a way of thinking. And, as Mumford reminds us, "Every technical process tends, in its perfection, to eliminate the active worker from participation and to produce an effective substitute: the automaton." (23:52) And so in the midst of great national pressure to increase the number of scientists and engineers, to change the curricula of schools and colleges in the direction of more abundant and rigorous offerings in science and mathematics, to invent and apply new machines and systems in the armed forces, in government, in industry and commerce, it is also not surprising to see emerging powerful social pressures that are opposed to unrestrained technological development. The great strike of 1959 in the steel industry was, so the analysts

tell us, at bottom an issue over automation, displaced jobs and the new role of the worker. The active worker has resisted, since the beginnings of the several industrial revolutions, his elimination by an automaton—whether loom, sewing machine, computer, television camera, or automatic steel puddler.

These two forces—the national (and private enterprise) drive for technological superiority and the resistance by special groups to the introduction of specific technologies into various segments of our society—are not new, but have certainly increased in degree until they are different in kind from similar actions in former times.[1] In the long view, however, we do not see much visible effect upon the onward march of research, development, invention, and application.

The most powerful movement today is, without question, that associated with the *increase* of technology. Admiral Rickover, for example, is not an isolated phenomenon. While no scientist, he is a technical administrator and, to the public, he speaks with the voice of SCIENCE as he demands an increasingly technological education for all. Even 20 years ago the thought that an admiral in the U. S. Navy would become, almost in an official capacity, a spokesman for reform of the public school system of the United States would have been unthinkable. Today, many sectors of the general public expect that he should.

The result of all this pressure for increase is a sort of Parkinson's law of technology. One technician—be he pure scientist, applied scientist, or engineer—enters a new sector of development and four others automatically follow in his footsteps. And four more for each of the first four. Before long, a new territory has succumbed.

Technology, in this sense, absolutely refuses to be confined. There are few areas of human interest that are sacred from invasion. Religion, perhaps, but not love, nor poetry, nor the composition of symphonies, nor the teaching of the young. With this continual extension, there must be great temptation for the technologist, literally, to "take over." As an example of this phenomenon close to the hearts of educators, it might be well to examine the activities of the National Science Foundation and the National Academy of Sciences. It will be found, I suspect, that the two of them have already taken over some functions of the United States Office of Education, the NEA and

[1] A brief statement identifying several approaches to the study of the social effects of technology appears in the *Notes* at the end of this paper.

its departments, and other possible "non-scientific" groups of educators,[2] and are, in fact, busily spawning a "scientific" educational bureaucracy. Such a bureaucracy is but the beginning—and there are many others in other fields—of a movement I have dubbed "Neo-Technocracy." The Neo-Technocrats have, in fact, moved farther into positions of power and control in a few short years than Howard Scott ever imagined possible when he was promoting the original Technocracy in the days of the Depression.

Turning now to education, it becomes apparent under this national and international drive for technological superiority that: (1) those concerned professionally with education have not developed a well-conceived point of view and a position and/or positions concerning technology and education,[3] (2) because of this lack of a point of view and because of certain cultural lag factors naturally associated with education, the acceleration of technological development has tended to by-pass the entire educational enterprise until very recently, (3) professionals in education are not prepared now to deal with the tremendous impact that technology is beginning to have on the instructional process itself as, by the technological process of extension, technology begins to invade education in full force, and (4) the absence of understanding and a point of view among the profession creates a situation where the Neo-Technocrats not only can, but are beginning to move into the field of instruction.[4]

Statement of Rationale

The statement of the rationale of this paper is best accomplished by presenting four propositions, as follows:

1. For purposes of analysis, the American educational system taken as a whole may be considered as a *society*.

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[2] As an amusing sidelight, the NSF has a brochure offering certain kinds of rewards to personnel in the various sciences and the "scientific" side of certain social sciences, for example, mathematical economics. Included, with approval, in the "scientific" studies is the subject of philosophy of science! To be fair, the NSF itself is probably not to blame. Congress and the conditions surrounding the use of funds have set these boundaries. The point, however, is still valid.

[3] During the Depression, Harold Rugg, George Counts, and others attempted this, but an examination of their work shows that almost the entire focus was on the economic effects of the increasing technology and the kind of education necessary for economic reorganization and survival. Other aspects were either slighted or missed entirely. See, for example, Rugg's *The Great Technology*.

[4] An immediate example—the so-called MIT Physics Group—comes to mind. Professor Zacharias has gone into the educational film-making business.

2. The introduction, on a large scale, of technology into this (educational) society will be accompanied by the same types of stresses and strains, initiate the same types of problems, accomplish the same classes of objectives, and force similar reorganizations as the introduction of large scale technology into any society, subject of course, to modifications by the unique factors inherent in the specific (educational) society.

3. Because professional educators for the most part have not, up to this time, viewed current technological problems from this orientation, but rather, if at all, in specific contexts, (for example, problems associated with the sudden introduction of television into education) it will be necessary not only to review thoroughly current educational theories from this more general point of view, but to create new theories encompassing and anticipating the new technological directions.

4. This new orientation toward technology and education will require rigorous analysis of the nature and possible roles of specific technological developments, the relation of these to educational purposes, and the prediction of effects on the society.

The remainder of this paper will attempt to delineate some of the elements of this technological study, to relate and analyze current and predicted technological developments, and to suggest some educational implications that might bear examination by the profession.

Definition of Technology

In sophisticated quarters of the intellectual world, definition is usually left to popularizing speech makers, as definitions are often assumed — mistakenly, perhaps — in professional discourse. However, when considering technology in its relations with education, definition cannot be left to chance. Many curriculum specialists, philosophers, administrators, and subject-matter experts are inclined to think of technology exclusively as *machines*. Nothing could be further from the truth. Machines are, of course, an indispensable part of technology. Even the dictionary definition, however, goes beyond machinery. The *Funk and Wagnalls College Dictionary* (the one I have closest at hand) defines technology as: (1) "Theoretical knowledge of industry and the industrial arts," and (2) "The application of science to the arts."

A much more useful concept for our purposes is contained in a little-known discussion of technology by Charles A. Beard. Beard says, in part:

> "What then is this technology which constitutes the supreme instrument of modern progress? Although the term is freely employed in current writings, its meaning as actuality and potentiality has never been explored and defined. Indeed, so wide-reaching are its ramifications that the task is difficult and hazardous. Narrowly viewed, technology consists of the totality of existing laboratories, machines, and processes already developed, mastered, and in operation. But it is far more than mere objective realities.
>
> Intimately linked in its origin and operation with pure science, even its most remote mathematical speculations, technology has a philosophy of nature and a method —an attitude toward materials and work—and hence is a subjective force of high tension. It embraces within its scope great constellations of ideas, some explored to apparent limits and others in the form of posed problems and emergent issues dimly understood. (3:xxii-xxiii)

The educationist, in considering the effect of technology on the instructional process must remember that, in addition to machinery, technology includes processes, systems, management and control mechanisms both human and non-human, and above all, the attitude discussed by Beard—a way of looking at problems as to their interest and difficulty, the feasibility of technical solutions, and the economic values—broadly considered—of those solutions. This is the context in which the educator must study technology.[5]

The Possible Relations of Technology With Education

Technology relates to education in at least three major ways. First, in a society in which science and technology are primary, such as America, the society requires that the educational system insure an adequate supply of scientists and associated technicians. This requirement sets a curriculum problem, an organization problem, and many other problems associated with the screening, selection, and education of young people as potential additions to the nation's technical manpower.

Second, as a society becomes more and more technologically oriented and controlled, the question of the general education of all citizens is raised. The survival and management of the whole society theoretically requires more general education in the sciences and technology for all. Pressures arise for more mathematics and science to be taught to the entire population. Again, curriculum problems, organization problems, and a host of nagging, persistent general education problems arise.

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[5] For purposes of this argument, no distinction is made between "science" and "technology" nor between "pure" and "applied" science. The distinction between "basic" and "applied" research is perhaps more meaningful, but these two activities are still regarded here as positions on a continuum. From a societal point of view, it matters little whether the society is hit with new ideas or new processes that stem from the ideas, or, as is more likely, a combination of the two.

Third, because of the tendency for technology to have no limits and constantly to extend into new areas, it is inevitable that, in an advanced technical society, technology should begin to extend into the instructional process itself. As will be shown, this is particularly true when education has been, for a century or more, one of the areas of American society which has walled itself off from technological advances and, consequently, has created a technological vacuum. That vacuum is now rapidly being filled.

It is with this third relationship—the application of technology to the educational, or to be more precise, to the instructional process—that the balance of this paper is concerned. The three relationships just discussed—development of technicians, general education in technology, and the application of technology to the instructional process—cannot eventually be completely separated. However, the third relationship is sufficiently different to merit thorough analysis.

Again, for purposes of this paper, a finer distinction will now be drawn. Within the educational process itself, there are three general areas in which technology can or is being applied. These are: (1) general administration, (2) testing, and (3) instruction. The uses of technical management systems, modern equipment, etc., represent the fairly obvious applications to the field of general administration. While it probably can easily be shown that this area of management is, taken as a whole, two or three decades behind its counterpart in industry, the problems associated with technology and school management are not as difficult as some of the others and will not, at this time, be considered. This is not to say that administration is not highly interrelated with the other two areas of testing and instruction, but the position can be taken that the problems arising from the latter two should guide the technical solutions in administration, not the other way around.

The second category, testing, is in many respects the most highly developed technology at present existing in American education. This is true both from a machine and from a systems standpoint. Further, the close relationships between psychological, achievement, and other types of testing and the instructional process are so well defined as to need no comment. However, with some exceptions, the technology of the instructional process can, for purposes of analysis, be isolated from testing. This arbitrary decision is made here in order to further the remainder of the discussion. We are left, then, with the instruc-

tional process by itself and can now turn to the impact of technology upon that process.

The Development of Instructional Technology

The development of a technology of the instructional process is relatively new. For guidance as to this development, the reader may refer to the chart on page 13 which roughly compares the development of industrial technology with instructional technology. In the pre-industrial phases of both education and industry while industry was principally at the handwork, artisan level, the instructional process relied upon such devices as the slate, the hornbook, the blackboard, chalk, and limited single textbooks with few illustrations. Although attention will be confined principally to some of the symbols of technology—equipment and machines—it should be emphasized that other factors—organization, etc.—were in the same state. As is well known, for example, the graded school is a late development.

At the beginning of the 19th century we note the famous changes in industry—the invention of a group of related machines for power, spinning, weaving, etc.—which made possible the factory system. Based on the work of Toynbee the elder, the term "Industrial Revolution" is applied to this period.[6] However, in education the same revolution did *not* occur and instructional technology (with some exceptions here and there) remained at the pre-industrial level. During the last quarter of the century, there was some indication of a change. Oliver notes that an exhibit from an American school "with maps, charts, textbooks, and other equipment" won admiration at the International Exposition in Vienna in 1873. He adds that the American school display at Paris in 1878 was even more outstanding (26: 298-99). Significantly, Oliver's last mention of international attention to American instructional technology was at Melbourne in 1880.

By 1900, on the other hand, industry had established factories and was moving into assembly line operations; had begun to apply, in a crude way, research and development concepts; had introduced the beginnings of modern management; and had developed a sophisticated financial system. Developments had reached such a state that the perceptive Henry Adams, the true prophet and seer of technology, foretold the coming of the Age of the Atom and the problems it would bring

[6] Now called the First Industrial Revolution.

CHART I

INDUSTRIAL VS. INSTRUCTIONAL TECHNOLOGY

(all dates rough approximations)

INDUSTRY	INSTRUCTION
Pre-industrial Production Technology . . artisans, handwork, etc. . . invention of specific machines, and technics. TO 1800	*Pre-industrial, Instructional Technology* . . hornbook, slate, blackboard and chalk, limited single textbooks, few illustrative and graphic materials.
Mass Production Technology . . establishment of factories; gradual development of machines . . assembly lines . . modern capitalism . . management concepts . . new power sources, etc.	. . some signs of American leadership . . maps, globes, blackboards, etc. (1875) TO 1900
	. . addition of laboratories, project methods, libraries, very small amounts of audio-visual materials . . *Still Pre-industrial in Concept and Execution*
TO 1950	TO 1950
Pre-Automation Period . . "Detroit automation," working computers . . development of systems and operational concepts. TO 1955	*Potential Mass Production Technology* (Unrealized) . . Legacy of WWII for AV Materials . . ETV possible . . "saturation concept" . . all not applied significantly. TO 1955
Automation Period Dawns . . the automatic factory . . the space age. TO 1960	*Eurich-Stoddard Mass Production Period Dawns* . . the pressure for ETV and mass instruction with master teachers . . TO 1960
	Potential for Educational Automation Appears . . the era of teaching machines . . stratovision . . the automatic classroom.

BY 1959, IN ACTUALITY, INSTRUCTIONAL TECHNOLOGY HAD BY NO MEANS REACHED THE MASS PRODUCTION STAGE ON ANY SCALE.

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BY 1959, IN ACTUALITY, INSTRUCTIONAL TECHNOLOGY HAD BY NO MEANS REACHED THE MASS PRODUCTION STAGE ON ANY SCALE.

(1, 2). In the years to 1950, aided by the acceleration of two wars, technology burgeoned and developed, piled machine upon machine, system upon system, added fantastically to power, and invented the method of invention. Technology transformed American society, philosophy, and art.

Technology, however, during the period from 1900 to 1950 only washed lightly upon the shores of instruction. During this same time span, when high speed printing techniques, radio, sound motion pictures, television, and other pieces of communication technology were invented, developed, and exploited, American education failed to apply these devices in quantity to the instructional process and failed to develop the appropriate technological systems necessary for this application. There were always rumblings, to be sure, as evidenced by the statement attributed to Edison in 1916 that the motion picture would replace the teacher. However, looked at from the vantage point of 1960, laboratories, project methods, libraries, and minute arrangements for audiovisual materials—the provisions to 1950—constituted what was still a pre-industrial technology for instruction.

By 1950, industry had entered what may be called the pre-automation period, which heralded the beginning of a movement toward true automation. At this time, much of the basic work on computers and other control mechanisms had been done. At this time also, mechanical systems of transporting work goods between machines had integrated some production lines into a system of mechanical or "Detroit automation." The period of automation was dawning, and I have arbitrarily set 1955 as the date at which this electronic-mechanical-systems analysis procedure began to be significantly applied. It is no accident that man began to push toward space at about the same time.

By 1950, American education had the potentiality, to carry on with the analogy, of a mass production technology. The hardware—projectors, recorders, television—and the materials were present. The systems concepts—saturation with audiovisual materials at the point of an instructional problem, for example, a concept derived from the military experience of World War II—were developed and known in a few audiovisual circles. A certain amount of incentive and public acceptance, also derived from World War II experience, could be drawn upon. The cake of custom, however, proved to be too tough and the mass production stage, at least 100 years behind industry, was not entered except here and there on isolated little islands.

At this point, approximately 1955, the god came out of the machine in the form of the Ford Foundation and Dr. Alvin C. Eurich (and a little later, his associate, Dr. Alexander J. Stoddard) to give the instructional processes of American education a sharp push into a mass production technology. The time was ripe. There was a shortage of teachers; education and educationists were under fire from all sides; Neo-Technocracy was turning its attention to education; the race with Russia was underway; the natives were restless indeed.

There are several interesting facets to this shove into mass instructional technology. First, television, both closed-circuit and broadcast, was chosen as the prime hardware. This was due, I think, to the unconsciously assumed basic concept of *mass production*, usually stated in terms of a shortage of teachers, large classes, and quality instruction. Second, the Ford impetus made provision, for the first time, for a technology of systems to go along with the hardware. Stoddard's own work in designing the school of tomorrow (54) and the work of Trump and his associates in drawing the instructional images of the future for the American secondary school (56) are, essentially, proposed systems.

Third, the Ford group made use of technology in creating the impetus in the first place. The technology of social psychology and public relations was drawn upon; educational decision-makers were the prime targets, and the means used, including high-priced public relations counsel, were the best available. This accounts for the fact that the teaching profession in general and audiovisual specialists in particular—really the only technologists of the profession—were for the most part left out of this move into technology.

Instead, the Foundation went to administrators and board members and influential opinion makers of all types. New organizations were approached—the National Educational Television and Radio Center (now, I believe, related to something called the Learning Resources Institute), the revitalized National Association of Educational Broadcasters, and the Educational Facilities Laboratories, Inc. Others were created. As a sign of this policy to short-circuit the profession, it is significant that, except for a small grant to promote a seminar or two, the Department of Audiovisual Instruction of the NEA was left out of the largesse.

The Ford people assumed, I think, that if the cake of custom was to be broken the priesthood was not the agency to break it. This may mean, in part and as far as audiovisual and curriculum people are concerned, that to an outsider their technological orientation is at the level of the water wheel and the hand-loom, not the computer and the rocket. It is something to think about. On the other hand, it may also mean in part that the Ford Foundation is merely another instrument of Neo-Technocracy and that these actions forecast even more loss of control of education by the existing pre-technological profession.

The Impact of Present Trends

With this background of development, we can now come to grips with the impact of the present technology. Here, our first principle should be recalled. If we consider education as a societal universe, what happens when we introduce energy into that universe suddenly and on a large scale? That is apparently what is happening. Two general effects, based on two analogous concepts can be predicted. If the concept of entropy holds good in this connection, the educational system will become more highly organized and less random in nature (negative entropy will increase); if the observed historical-anthropological law of the introduction of a system of technology into a culture holds good, the distortions, stresses, and non-predictable effects will increase until the culture becomes unrecognizable. Two historical events serve as examples—one taken from Mumford, the introduction of the clock to regulate the habits of Monks (22) and one from Muller, the invention of writing in Egypt for the purpose of keeping accounts (21). Both changed the world several times over and the effects of neither were, of course, predictable.

What, then, are the present trends? If you don't count the continuous, grinding, sweating struggle carried on by audiovisual specialists, dealers, manufacturers, and producers to introduce, one item at a time, film libraries, projectors, recorders, etc., into the educational system in the slow process of conversion from a pre-industrial technology, two major trends can be identified. These two trends, at the moment, lead in opposite directions.

The first is the trend toward a mass instructional technology and is governed by machines and systems suitable for that purpose. Foremost, of course, is television, of which there are four instructional

types: (1) broadcast on an educational channel, (2) broadcast on a commercial channel, (3) closed-circuit of the Hagerstown-Penn State type in which live instructors are used either to supplement instruction or to provide direct instruction exclusive of classroom teachers, and (4) the Compton type in which filmed lectures are distributed via the closed-circuit medium as replacement for classroom teachers. In all cases, the desire is to reach more students with fewer teachers or to obtain "quality" instruction.

Mass instruction technology in another form includes, of course, the massed film systems. The prime example is the EBF series in physics and chemistry, amounting to over 300 half-hour motion pictures intended to be used where there are no science teachers, where there are teachers not considered qualified, as audiovisual aids to more qualified teachers, and with very large groups of students. These films, of course, may theoretically be used over television. The exploitation of the overhead transparency projector is another example of mass instructional technology as shown in the Newton (Massachusetts) experiment in English grammar and composition.

In opposition to this trend of mass instruction is a growing technology for individual instruction. This trend is the audiovisual wave of the future (for the moment). The most dramatic development here is that class of systems and instruments known as teaching machines. Actually, I would class all teaching equipment designed for individual or near-individual operation as being in the category of teaching machines. At present, then, there are approximately five types, listed here on an ascending scale of sophistication: (1) individual reading pacers and similar devices, (2) individual viewing and listening equipment for existing slides, filmstrips, motion pictures, and recordings, (3) language laboratories of all types, (4) specifically programmed printed materials such as scrambled textbooks, the proposed Lumsdaine notebook, etc., and (5) true teaching machines of the Skinner or Pressey type containing carefully worked out verbal or pictorial programs with various ingenious mechanical or electronic arrangements to test student reaction, inform him of his progress, errors, etc.

Extrapolation I

These two major trends toward technologies of mass and of individual instruction are not science fiction; they are with us now. Assessment of this impact is our most pressing and difficult problem.

It does not take much of a crystal ball to see that a combination of these two technologies is the next immediate step. For example, let us take Maurice Mitchell's new series for his chemistry course on 150 plus films. Let us further assume that Mr. Mitchell makes a deal with the Rheem Califone Corporation to program their multiple-choice Didak teaching machine with material to go along with the chemistry films (Mr. Eurich might have to put up the money for the initial effort). Let us continue by saying we will project the films hourly on the Compton College closed-circuit television film distribution system and place the machines in proper cubbyholes for Compton College students to work at specified times. We could get, almost immediately, to what can be called total educational automation.

Or, in another context, let us suppose that the new Ford creation, the Learning Resources Institute, initiates another Continental Classroom in mathematics over national broadcast television; and that the new audiovisual teaching machines now being developed by Hughes Aircraft are programmed to relate to this new series; and that these machines are placed by the Foundation in every public library in America; and that, at the conclusion of the instructional period, students report to designated centers where the Educational Testing Service examines them and certifies them to the colleges of their choice. Think, for a moment, about that one. It is now possible, not only to eliminate the teacher, but the school system.

These may be considered extreme applications, but such applications, at least experimentally, are inevitable. In fact, one such study, testing the combination of these two technologies, is now underway. The point is that both the mass instruction systems and the technology of individual instruction—teaching machines—are getting terrific momentum. These technologies are going to hit education with a million-pound thrust. What will be the effect upon our educational society? What is the role of the teacher, the audiovisual specialist, the curriculum director? *Quo vadis* the curriculum itself? This last question is particularly pertinent if the medium or image governs the message, as McLuhan maintains.

Extrapolation II

Technology never sits still. The extrapolations given in the last section are immediate. What of those that can be made for a time

slightly farther into the future? I see several developments. First, it is reasonable to expect that programming for teaching machines will move from the verbal-Socratic-Skinner type to the audiovisual-branching type. That is, the machines will present, based upon student pretests, conceptual content using films, slides, filmstrips, tapes, and/or video tape as the medium. The presentation sequences will be longer and the student will be given an opportunity to select additional sequences for further explanation if the machine, through testing, informs him that he needs it. Records, of course, will be maintained instantaneously by miniaturized computers.

Secondly, the work in England of Ashby, Pask, and others with teaching machines based on the design concepts of biological computers will affect the technology of the present teaching machine much as transactional psychology affects stimulus-response psychology. Pask has already produced a machine which, in training key punch operators, actually senses the characteristics of the student as he works and automatically adjusts the program of the machine to the student's individual needs. This is a pure transaction, and Pask maintains he can develop such a machine to teach decision-making with present hardware and know-how[7] (46).

A second development of the future begins next year with the stratovision experiment of the Ford Foundation over a city in Indiana. News of this experiment is gradually filtering into educational circles and has appeared here and there in the press. One or more airplanes, carrying multiple television transmitters circling overhead can receive multiple signals from the ground and broadcast them over much greater distances than conventional tower transmission. The programs will go into several states and, because of the location, into both urban and rural areas and into innumerable heretofore independent school districts. Effects of this on local control of curricula, curriculum planning procedures, images of master teachers, patterns of school organization, etc., have yet to be speculated about, let alone explored. Nothing technical would prevent, by the way, a national network of such aircraft as an addition to our other national means of transmission.

A third predicted development is based on information that it is technically possible, although not yet economically feasible, to pro-

[7] A machine produced by the Western Design Division of U. S. Industries was presented to the press in New York on October 15, 1959. The machine "interacts" with the student, but, if press information can be relied upon, not in the manner of a biological computer. (*Santa Barbara Evening News*, October 14, 1959).

duce a motion picture film with characteristics similar to the Polaroid film that is instantaneously developable. What this would do to videotape, to production techniques, and to the possibilities of local production of materials is of great interest to the audiovisual field.

The fourth development that can be anticipated is the most spectacular. Essentially, it is based on a systems concept. It is theoretically possible now to design an automatic classroom under the control of the teacher. Most of the elements are present or can be designed. Such a classroom would have total light and air control, automatic projection and television systems, technical provision for the best possible discussion environments, display situations, etc., which could be changed at will. By planned programming the classroom could be made to function for major presentations, small group discussions, individual work at teaching machines, creative periods, etc. All of this *could be* under the control of the teacher. The classroom then would become the teaching machine. Adrian TerLouw at Eastman Kodak has done some work in this area and it is, of course, implied in the provocative article by Simon Ramo which is so often cited in discussions of teaching machines (51). An acquaintance of mine refers to this concept as the "mad scientist" classroom.[8]

If we look at this series of possibilities, we can sense a change in trend. Of the four cited, only one—the stratovision experiment—is clearly on the side of mass production. The other three lean toward the technology of individual instruction. The automatic classroom is a combination of both, but one in which the human element still plays the central part with the machines being the slave of man, not the other way around.[9]

Implications

To assess the implications of this current and predicted impact of technology on the instructional process is not easy. As with any such

[8] The multiple projection system developed by Teleprompter and a somewhat similar unit announced by Harwald would seem to make it possible to *simulate* the "mad scientist" classroom, although admittedly, this is reaching a little. The new motion picture projector developed by the MIT Physics group and the proper programming of a device called the "Perceptascope" could accomplish similar effects.

[9] Since writing this, I have seen documents describing, in some detail, the objectives of the Ford Foundation's Learning Resources Institute. The LRI is to be a gigantic source of mass instructional technology. The stated ambitions are so great, the funding so large that the direction postulated in Extrapolation II might well be reversed. The potential dangers of such a development are also very great.

speculation, it is also hazardous. It is, however, a job we must attempt.

We have to start, I think, with the proposition that, based upon the historical development of instructional technology, our educational society is in the position of a backward or underdeveloped culture suddenly assailed by the 20th-century engineer. In addition, reactions in some professional circles to the advent of television are similar to those factory workers of the 19th century who attempted to destroy the machines that were replacing their jobs. In the long run, the machines remained; instructional technology is, no doubt, here to stay. Our problem becomes one, not so much of how to live with it on some kind of feather-bedding basis, but how to control it so that the proper objectives of education may be served and the human being remain central in the process.

Certain things are obvious. I think the concept of negative entropy [10] will hold. The thrust and energy of technology will force a greater organization upon us *at every point at which it is applied to instruction*. Such an arrangement as the stratovision experiment will require a tighter and different organization in those five or six states and in those many school districts of the Midwest. The closed-circuit experiment just beginning in Anaheim, California, is already, it seems to me, making requirements for organization—of scope and sequence in the curriculum, of the district itself, and of the nature of the television presentations—the rigor of which has never been felt before in Anaheim.

Programming, in its machine, computer, and automation sense, is a matter of extreme organization—the piling up of energy.[11] Most of the devices and systems of the new technology require, one way or another, this type of programming—television, teaching machines, mass films, language laboratories. This means that programmers are needed. Who is to do this? This is essentially, in the old sense, both a curriculum and an audiovisual problem. It is also a social problem. The heartland is programming. He who controls the programming heartland controls the educational system. Will it be a Foundation, a committee of scientists, textbook publishers and film producers, the

[10] In all the tests I have been able to think of, this concept holds. I am almost convinced that this idea can achieve some status as, forgive me, "Finn's Law."

[11] The role of energy in relation to AV communication theory needs much study. For example, the energy involved in the negative entropy concept should be examined in much the same way that Cottrell studied energy in general in *Energy and Society*.

NEA, the school superintendent, the board of education, the students, or the general public?

Too, how many of us will go overboard and sink with the old concepts that will be absorbed or outmoded and tossed to the sharks by the new technology? Take the concept of instructional materials which some curriculum specialists love so well and which caused quite a controversy in DAVI circles a few years ago. The fight was futile, as is the love. The concept of programming and the systems and systems analysis it implies completely absorbs the idea of materials. Instructional materials becomes an outmoded atomistic, pre-technological concept useful mainly to the historians of education.[12]

The concept of audiovisual education may accompany instructional materials down the drain, or it may not, depending on whether or not it can be redefined acceptably.[13] The Skinner and Pressey type teaching machines and their descendants are, for example, primarily verbal devices, and yet their management, programming, etc., as technical electronic devices belongs somewhere. At a practical level, within a school situation, someone is going to have to worry about them. It is my position that the audiovisual field is in the easiest position to help integrate these mechanisms properly into the instructional process. They are not primarily audiovisual; they are primarily technological. The AV field, I think, must now suddenly grow up. We, the audiovisual specialists, are, of all educational personnel, the closest to technology now; we have, I think, to become specialists in *learning technology*—and that's how I would redefine audiovisual education.

What of the curriculum people? Their work is just beginning. It can become infinitely more rigorous and, at the same time, more satisfying. I suspect some of the emotional Rousseauians will have to get out of the curriculum business. The rest can step in and face this problem of programming a learning technology in human terms and find great excitement and reward.

Finally, we must remember the stresses and strains of introducing technology into our pre-industrial culture and the unpredictable consequences of any technological advance. If the profession continues to react like the California Teachers Association did toward television, we'll end up with a new profession. Not that I approve of the so-called Compton concept which shocked the CTA, because em-

[12] McLuhan maintains the same thing about audiovisual aids (42).
[13] Redefinition is the subject of a paper now at press.

phatically I do not. The great mistake of the CTA statement was that, at a point where precision was an absolute necessity, the CTA chose to lump all educational television—broadcast and closed-circuit, general and in-school—into one pile and then indicate that the CTA was against sin and in favor of home and mother. The statement was unrealistic, imprecise, and failed to deal with the issues. We have a right to expect better from a large professional association of teachers. The profession as a whole must be made to sense this powerful movement to instructional technology and be made ready to seize the great opportunity it offers to make *all* teachers highly professional.

The Philosophy of Adventure

In closing, I should like to return to the position I took in my Los Angeles address to the DAVI National Convention in 1955. Whitehead has said that it is the business of the future to be dangerous. Technology certainly has made this aphorism into the outstanding fact of our time. Technology is now making the future of instruction capricious and hazardous. But in doing so it has presented us with more opportunity and more choices than ever before. If the future is an adventure, it is an adventure *because* of technology. The cost of civilization is the fact that we can make wrong choices because of the alternatives technology presents. The reward of civilization is the freedom provided by technology and the opportunity to make the right choices. This cost and this reward we now face with the technology of the instructional process. We *must* look forward to the adventure and not present what Herbert Muller noted as "the curious spectacle of civilized man forever marching with his face turned backward—as no doubt the cave man looked back to the good old days when men were free to roam instead of being stuck in a damn hole in the ground." (21:65) The "good old days" are gone; approached with intelligence and zest, the days of the future will be better.

NOTES

It is not the intention of these notes to start another paper, or for that matter, a book-length overview of man's efforts to consider technology and its relation with society. Students of technology have approached the subject with various emphases. There are generalists, too, as shown by the great four-volume work of Lewis Mumford (*Technics and Civilization, The Culture of Cities, The Condition of Man,* and *The Conduct of Life*). However, Mumford, himself, pointed out that no one chose to follow his technique of study in depth (22). Bertrand Russell is another generalist returning to the subject in many of his works and considering it directly in *The Impact of Science on Society*.

At least four identifiable approaches to the problem of technology have been taken by critics, philosophers, and theorists. By far, the largest volume of literature has been concentrated on the relation of technology to economics, organization patterns, and general social problems. The classical criticisms of industrial developments in England and Europe, such as those presented by Owen and Marx, are in this vein. Thorstein Veblen, with his *Instinct of Workmanship, Theory of the Leisure Class* and *The Engineers and the Price System*, critical analyses of the economic problems of a technical society, is an ancestor, perhaps, of Stuart Chase and Lewis Mumford, writing sometime later. These are but samples; there were the technocrats, the social novelists, and college presidents like Nicholas Murray Butler, all having something to say pro or con about the growing American industrial society.

At the present time this general concern continues. We have William Whyte worrying about the Organization Man. David Riesman is concerned with the other-direction supplied by a technological society; John Kenneth Galbraith suggests new economic directions for a society that has solved the problems of production; and C. Wright Mills studies the new elites and the growing technocracy in social science thinking.

Secondly, we have a small and quite vocal minority that views technology in terms of its potential force for destruction, both of the race of man and of the human personality. Descending perhaps from H. G. Wells, such thinkers would have to include Aldous Huxley, Erich Fromm, and the small number of rebellious scientists who are worried about THE BOMB, fall-out and eventual wearing out of all our natural resources in the face of population growth. Included here, too, would be certain religious groups, writers, and some government officials.

In a third category is a group—almost a cult—devoted to intellectual resistance to the flow of technology. This group would include many members of the literary set in this and other countries, devotees of the New Criticism, the Humanities, novelists, critics, etc. Their literary world is being shaken to its roots by science and technology. Joseph Wood Krutch is one American spokesman for the literary wing of the anti-technologists. His *Human Nature and the Human Condition* is the latest in this view. One would also have to include here people who hold to Existentialist philosophy and, probably, the lowly and much-maligned beatniks.

The fourth approach to the analysis of technological effects stems from those who give thought to the problems of art and beauty; here the concern is with technology and aesthetics. Some of the controversies in modern art no doubt stem from this origin. There is much variation in thinking here. Ortega y Gasset, for example, speaks of the "dehumanization of art." Mumford, on the other hand, now states that the great contributions of technology to art are fully realized, but that technology is, in some cases, retrogressing in this regard (22). Critics and philosophers such as Robert Shayon, Gilbert Seldes, and Marshall McLuhan deal with the artistic possibilities and symbolic problems associated with the mass media, the most ubiquitous children of the new technology.

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The Scientific Principles of Textbook Design and Illustration[1]

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THE PRESSURE OF MODERN SOCIAL EVOLUTION with its exploding demands for more knowledge and more education has created a great upsurge of interest today in all things educational—the teacher, the student, the schools, educational methods, visual aids, television teaching, and even mechanical devices to substitute for teaching. Only one major aspect of the educational process has not been put through lengthy reappraisal, the books used in teaching. A scientific appraisal of the principles of the artistic design and illustration of textbooks is the object of this study.

What is the science of book design? How can more effective textbooks be developed? Can we chart a new program of book design? Can we develop a scientific theory to guide us in designing books that will also give us insight into the fundamental nature of reading and writing? Or, are books on the way out as teaching devices, to be replaced by mechanical gadgets, tape recorders, and television sets? These are the beginning questions of the science of book design which we can attempt to deal with in the future.

The theory of book design is a part of the theory of verbal learning. Today in psychology, a special point of view called "reinforce-

[1] This research was aided generally by funds from the National Science Foundation for a project on "Perception and Human Motion."

ment theory" dominates thinking about verbal learning. Reinforcement theory reduces the problem of acquisition of meaning to the strengthening of the specific verbal response by feedback to the individual of some rewarding outcome in the use of the word. The general point of view presented here denies, on the one hand, the arithmetic nature of this reinforcement process in reading and emphasizes, on the other hand, the role of perceptual or artistic reinforcement.

We relate the functional or organic theory of reading to be discussed here to the historical facts about the origins of writing and reading. From the outset, in the calendrical picture writing and in ownership seals of ancient Egypt, reading and writing have been related to picture art. The hieroglyphic symbol, or sacred writing, represents the highest point of picture writing, after which the written symbol came to be related to the sounds of speech. The abstract lines of thought in Greece and the influence of later religions on thinking separated writing and books from picture art. It is this abstract tradition in book design that we inherit. With the modern explosive expansion of technical knowledge, the two forms of manual expression—picture making and symbol writing—have been joined together again, not only in the form of concrete representation of things, but also through the use of abstract line designs and graphs which describe the interaction between events. Our purpose here is to interpret this history of writing and artistic illustration in relation to scientific concepts and principles of book design.

The general ideas here are not only theoretical in nature. Most of them have been applied in the design of an artistically illustrated textbook (Smith and Smith, 1958)[2] and an artistically illustrated workbook in psychology (Smith, Smith, and Hansche, 1958). Samples will be taken from these books to illustrate the use of artistic drawings in directing, strengthening, and motivating the individual to read and of the design of books to improve reading.

Principles of Illustration

The general idea pursued here is an organic or functional theory of textbook design. When we use the term organic we mean that the design of the book and its illustrations must emerge from several inte-

[2] The overall design and illustration layouts for this book were prepared by Donald M. Anderson, who was assisted in the execution of the finished art work by Bill H. Armstrong, Bob Burkert, Nancy Ekholm Burkert, Donald Grover, Burke Martin, and Dorothy Zupancich.

grated sources—the materials and machines of printing, the specific requirements of subject matter, and above all, from the natural processes of behavior and communication—both verbal and non-verbal—that go into reading and study. The view proposed and applied here is that these natural processes of communication in textbooks demand the use of various forms of impressionistic, representative, and abstract illustration in order to bring effective organization to textbooks and to create books which not only meet the perceptual and artistic needs of the student, but also refine his understanding of what is read, improve his retention of material, and stimulate the development of creative thought.

Creative art in books serves three main functions. First, it serves to *perceptually motivate* the reader—to attract him to pick up the book, to explore it, and above all to develop a high feeling of expectancy in turning each page. Second, artistic illustration *perceptually reinforces* what is read, so that the situations, events, and relationships described in words are made more meaningful and thus are better retained. Finally, correlated art *symbolically enhances* and deepens the meaning of the verbal material and thus serves to advance organization of the verbal materials to promote creative thinking.

This organic theory of reading puts stock in some of the most favored features of books, as compared to mechanized, controlled instruction by mechanical or electronic means. Books confer a freedom on the student that these controlled means of instruction do not. The reader can flip pages at will, seeking expression of his own interests and needs, probing deeply into difficult subjects, and passing over what is well known. The general theory under discussion suggests that these salient features in books can be enhanced through creative art, that the reader's probings can be deepened by better vision, and that his motivation can be increased by artistic programming of subject matter.

Perceptual motivation and art in reading. Reading is always in part a perceptually motivated activity. It may involve other motives, such as the pressure to study or to cope with examinations, but it also consists of activity directed and sustained by observing visual patterns (words) and by the perceptual relations, actions, and situations created in the experience of the reader by the words.

Artistic illustration can strengthen perceptual motivation in reading by giving immediate perceptual organization to the environment

created by the printed matter and the situations and actions described. If a book is not illustrated, the reader perceptually reconstructs and projects himself into the events and situations of the book through the process of verbal symbolism. Art quickens this organization, and gives to words an immediate meaning which the reader, through his limited experience, may not be able to develop.

This artistic enrichment of a book creates what we call the "perceptual space" or "environment" of the book. In order to create a rich perceptual human environment in the book on behavior, a great variety of illustrations of people were used, as shown in Figure I. People of different ethnic origins and of different ages, size, form, and manner were shown. For example, Figure Ib describes a panel of personalities which was employed to symbolize the field of individual differences. The belief is that the well-organized perceptual environment provided by such illustrations gives the reader a continued feeling of familiarity with his surroundings, and one that is seemingly animated with human life.

Art can increase perceptual organization during reading in a second way, which we might call *artistic segregation* and *programming* of the reading material. By these terms we mean the highlighting of main concepts, events, and situations in the reading by illustrations in a progressive and systematic way.

Some of the possible techniques of artistic programming which have been used are shown in Figure II. At the beginning of each chapter of a book a theme drawing, usually of an abstract nature, is used to set the stage for the main characteristics of behavior to be described in the chapter. For example IIa is meant to suggest the almost infinite detail of human perception, as well as its characteristic object and space properties. Descriptive sequential and classificatory drawings, such as the illustration of the perceptual motivation of a child for his blanket (Fig. IIb), are used in introducing a subject in order to establish familiar ground plans before the later introduction of detail. To illustrate such detail, highly representative drawings, sometimes combined with line or bar graphs, are used.

There are still other techniques of artistic programming of subject matter. The initial subject drawings in a chapter are made easier to understand and more general in their meaning than those illustrating more detailed subjects. Later drawings in the same chapter describe detail and interactions. Other drawings spell out complex sequences

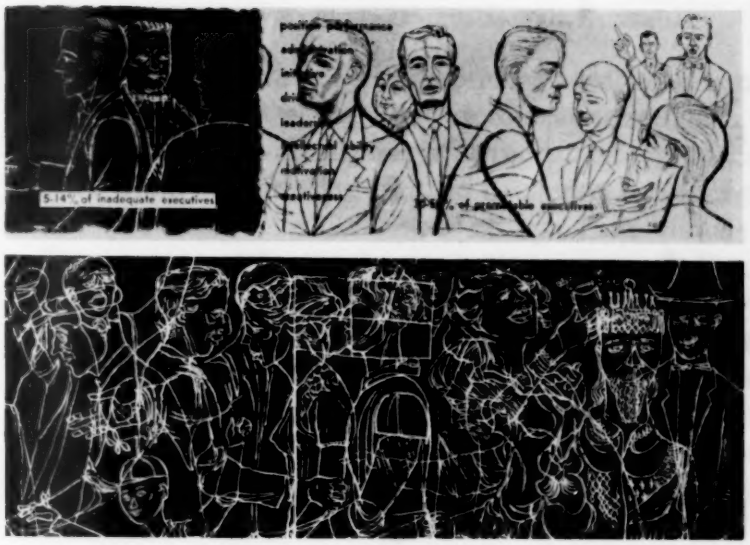

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FIGURE I. *The creation of an integrated perceptual environment within a book by means of sustained artistic illustration.*

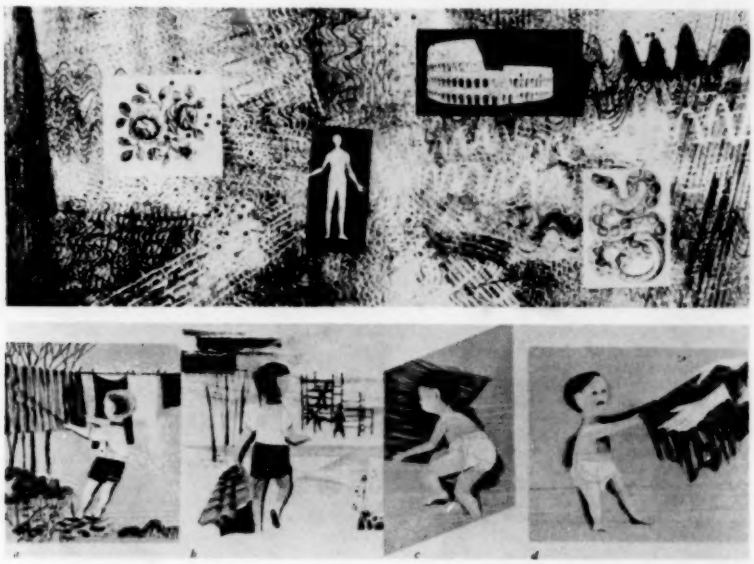

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FIGURE II.
The techniques of artistic programming.

(a) Abstract and expressionistic designs set the stage and define artistically the theme of a chapter. The design shown here illustrates the infinite detail and object qualities of human perception, along with the physical forces governing it. (b) Sequential drawings classify parts, stages, or sequences of events within a topic. The four drawings illustrate four stages in the perceptual motivation of the child for his blanket.

and classify events in many different ways. Still others illustrate theoretical ideas and relationships.

A third function of creative art in reading motivation is to promote the natural curiosity of people to explore, to seek new things, while still holding securely to things they already know. The importance of such exploratory, or general perceptual motivation has been recognized by psychologists for years as a primary form of both human and animal motivation.

Exploratory perceptual motivation is promoted by artistic illustration in two ways—by what we call the exploratory drawing and by use of unusual and varied art forms.

Figure III identifies a type of exploratory drawing. This drawing combines a series of fairly familiar things in an unusual relationship. There is a picture of a familiar face (Max Planck), a section from Lincoln's second inaugural address, a chord from Bach, a monk, a

FIGURE III. *Artistic enhancement of symbolism and thought in reading. The exploratory drawing is used to promote investigation and curiosity about relationships discussed only in part in the text.*

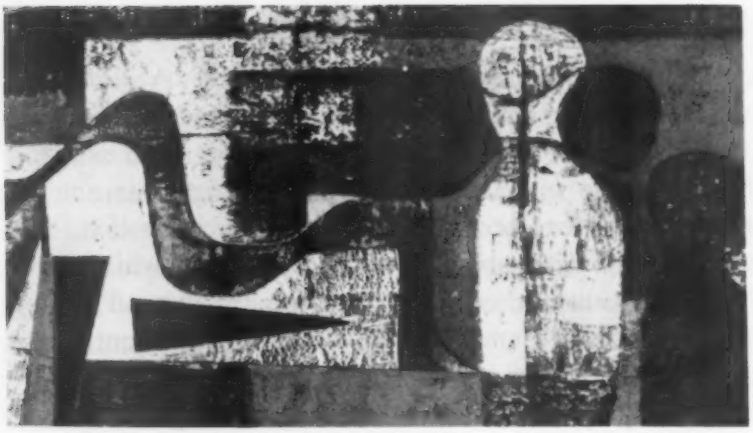
Neanderthal man, and a pointing hand. All of these symbols are indicated in the text as representing the pointing, signaling, symbolizing, motivating, and abstracting functions of language. The drawing is given a caption, but the specific meaning of each figure is not described. The student must explore with some help from the text.

Figure IV describes some unusual artistic techniques which have been tried in order to create theme drawings of an abstract or expressionistic nature which are employed to introduce different chapters in a book. Figure IVa is an expressionistic design of the dynamic relationships in human adjustment. Figure IVb is a special photographic study of human hands, combined in unusual relationships in order to illustrate emotion. Figure IVc is an oil emulsion effect produced on clear film by combining oil and India ink. The design was used to introduce a chapter on the organic or bodily mechanisms of human behavior.

Artistic reinforcement of verbal symbolism in reading. We identify a second function of art in book design. The view is that artistic illustration strengthens the learning process by providing additional experiences which confirm and extend the verbal responses. We call this artistic or perceptual reinforcement of reading. It involves information feedback from the artistic displays which serves to strengthen the symbolic responses of the reader. Such feedback is comparable to goal reinforcement in general learning where it consists of achievement of some reward or goal through reaction of the individual. The behavioral goal achieved reinforces or strengthens the response that led to it, and causes this response pattern to be retained better in memory than one which is not reinforced.

The goals of reading activity are primarily perceptual in nature, as suggested by the symbolism of words and sentences. To reinforce the acts of reading, we make these goals clear and definite by illustrative art. We use the artistic drawing to feed back information to the reader which confirms and strengthens the symbolism of the reading material.

The theory under discussion specifies a number of principles, one of which is to align subject matter and related art as closely as possible on the page. To achieve this alignment, the page of the book must be designed to accept the art. We have introduced the art column in a book, a half column that can be used for both illustrations and captions. When necessary, this space can be combined with



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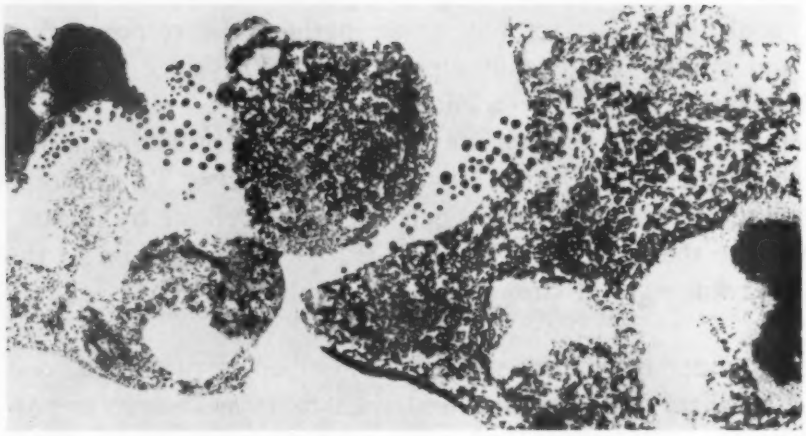

c

FIGURE IV. *Techniques of artistic programming in reading. (a) An abstract design is used to define environmental and individual interaction in adjustment. (b) A photographic montage of hands illustrates the behavioral expression of emotion. (c) An oil-emlusion design on plastic provides the essential impression or organic detail.*

column space for larger illustrations. The flexibility of this page design permits very close alignment of subject matter and art in most cases.

A second principle of perceptual reinforcement which we have developed is the close coordination of verbal, graphic, and artistic descriptions. Interlocking text with drawings and graphs is especially effective in describing experiments, as shown in Figure V. A drawing of the whole situation sets up the initial description of what goes on. A second stage drawing illustrates a critical detail also described verbally. Finally a graph presents the quantitative results of the observations. In this way, each stage of a sequential drawing reinforces the verbal symbolism as well as the prior stages of the drawing. The drawing in Figure V illustrates the stages of an experiment on perceptual motivation in the monkey. The monkey is trained to discriminate between a white and black door by rewarding him for a correct choice. (If he chooses correctly he is allowed to look out of his box.) The graph shows the learning of this discrimination habit.

A third principle of perceptual reinforcement in reading is to sharpen the verbal presentation by artistic means. We use bizarre drawings to characterize bizarre subjects, such as dreams. We use sequence and stage drawings to coordinate with descriptions of interrelated sequences and stages of experiments and other behavior. Many full-color paintings and photographs illustrate color phenomena of visual perception.

One technique used to sharpen and thus reinforce descriptions of social behavior is to portray groups of people as if observed from a vantage point high above them (Fig. VI). Such drawings create the illusion of actual observation of social events. These drawings also make possible diagrammatic representation of groupings and interrelationships among individuals and groups.

Another method of artistic sharpening which has been tried involves matching the design and execution of a drawing with the time and nature of the particular topic with which it dealt. An example of this matching in Figure VII shows a panel of primitive figures designed to illustrate the primitive origins of language.

There are still other ways to correlate subject content and artistic illustration. One is to utilize the special artistic talents of different contributing artists and their feeling for certain subjects in the execution of particular drawings. In this way, techniques of execution are

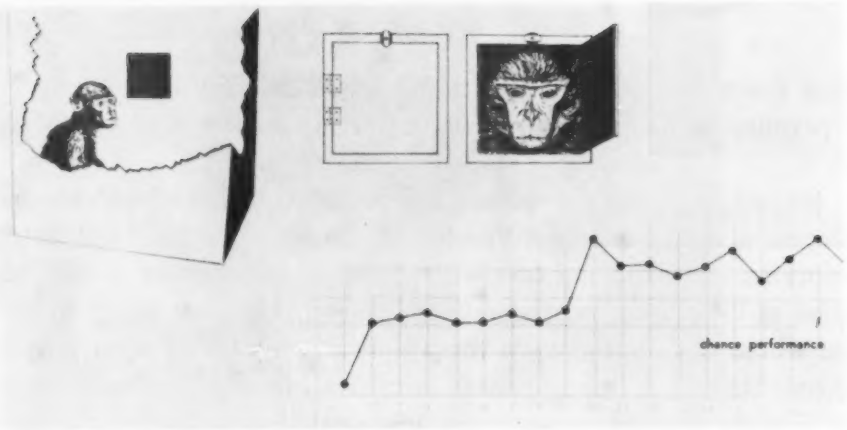

FIGURE V. *One technique of perceptual reinforcement in reading. Integration of artistic and graphic descriptions of behavior, which are described in the text in sequence.*

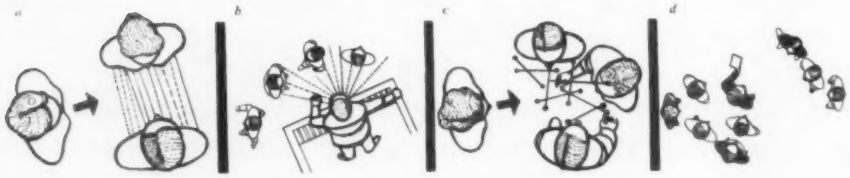

FIGURE VI. *Techniques of perceptual reinforcement. Drawings of social behavior reveal the impression of observation of such behavior at a distance or other vantage points.*

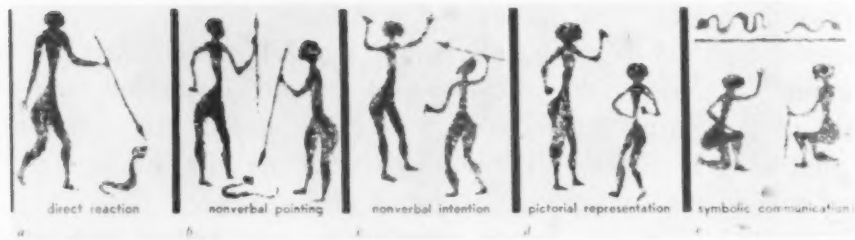

FIGURE VII. *Techniques of perceptual reinforcement. The execution of a drawing is made to correspond to subject matter. In this case a primitive type of artistic execution is made to depict the primitive origins of language symbolism.*

fitted to the particular subject. As a result, drawings of different subjects—animals, children, males, females—are differentiated by artistic techniques as well as by the topics with which they deal.

Artistic enhancement of creative thought in reading. To appreciate the functions of artistic illustration in promoting creative thought, the difference between verbal and non-verbal communication and their complementary relationships need to be recognized. The effectiveness of spoken language depends not only upon verbal communication, but also upon non-verbal patterns, including gesture, emotional expression, tone of voice, inflection, and posture or body language. Written language ordinarily lacks the context of non-verbal communication characteristic of oral speech. Unadorned writing substitutes for this non-verbal base various techniques of individuality in writing or literary style. However, artistic illustration can be used to give a foundation of non-verbal communication to written language, thereby promoting originality and creativity in the reader's symbolic responses.

The artistic enhancement of creative thought in reading involves principally the matching and interplay of different forms of art—representative, abstract, and impressionistic—with the demands for concrete description, clarification of abstract relations, and expression of emotional tones and values in the writing. We have tried out various forms of artistic illustration matched with different types of abstract, evaluative, and concrete subjects.

Some artistic impressions of human events related to mental illness are shown in Figure VIII. From our point of view, these drawings accomplish what no series of photographs or even actual observations of mental hospital patients could do. They give a symbolic interpretation of individuals in difficulty within the strange environment of mental illness, and they do this with a persisting compassion for the people and a consideration of human values. They invest the word meanings of the text with the immediate potent non-verbal impressions and meanings of artistic symbolism. The interaction within the reader between these two forms of symbolism, one verbal and the other non-verbal, may very well be the key to a whole new line of creative thought on the part of the reader.

We use abstract art as a form of non-verbal communication correlated with abstract concepts defined in the text. As examples, abstract designs illustrate dynamic phenomena of force, energy, motivation

Figure 17.7. Forms of schizophrenia. a. The simple schizophrenic often makes a borderline adjustment to the world. b. The hebephrenic shows regressive forms of behavior. c. Rigid, stereotyped behavior marks the catatonic. d. The paranoid schizophrenic has delusions, and is usually extremely suspicious and apprehensive.

FIGURE VIII. *Artistic enhancement of symbolism in reading. A drawing of behavior in mental illness enhances the human values of behavior disorder.*

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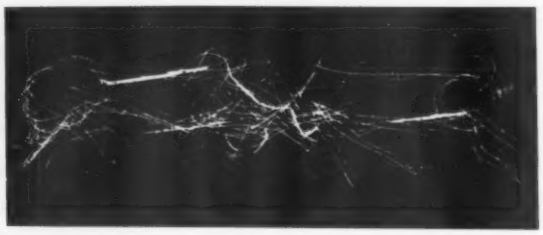
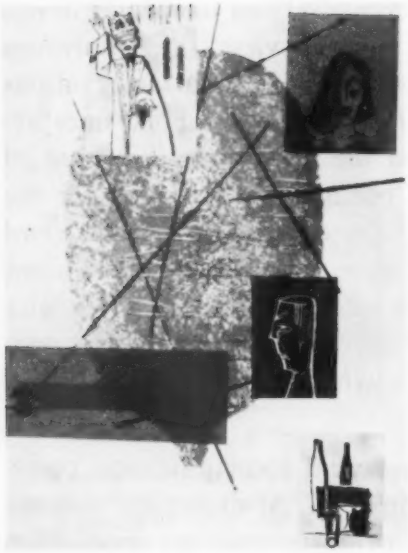




b

FIGURE IX. *Artistic enchancement symbolism in reading. Abstract drawings are used to enhance concepts of force in motion and motivation (a) and interaction in conflict (b).*

(Fig. IXa), interaction of events and conflict (Fig. IXb). Such dynamic phenomena can never be described adequately by words alone. Abstract art, along with such visual representations as the quantitative graph and the mathematical formula, can be used to give non-verbal meaning to descriptions of dynamic relations and interaction of events.

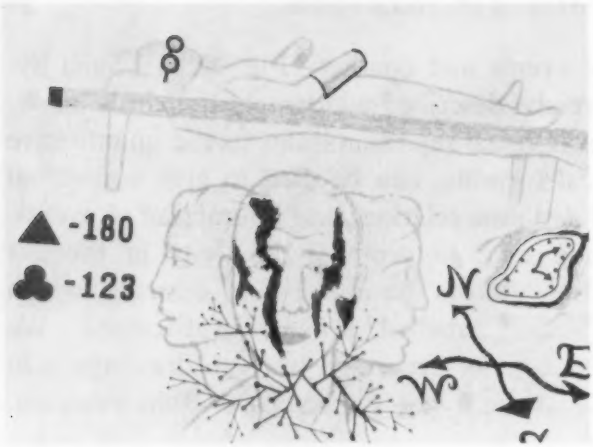
Another type of drawing used to promote creativity in thought through non-verbal communication is the *exploratory drawing,* which is captioned but not specifically labelled, as already discussed. We believe that the exploratory activity generated by such drawings is in itself a process of creative thought not far removed from research.

Application of Principles

The workbook is the original "teaching machine." It too can be designed in terms of specific principles of artistic illustration in order to promote perceptual motivation, learning, and creative thought in reading and study. Several new ideas of visual design have been tried out in preparing a general workbook for a psychology textbook.

The general theory of workbook design is that visual art provides the essential perceptual materials with which the student can work in answering general questions, solving problems, answering self quizzes, or doing projects contained in the workbook. If there are no rich sources of materials to guide the work, as there are in the social sciences, most students find a workbook unrealistic, too abstract, non-challenging, and unrewarding as a task. Correlated visual art in a workbook, extracted and modified from the related textbook, provides the means of promoting and aiding transfer of learning from the textbook to the actual work efforts by the individual student.

Our notions of the design of workbooks follow in general the principles already discussed. We demand a lot of illustrations to keep a varied environment for the student. The workbook itself is divided into chapters headed by an abstract drawing or photographic montage which is related to an introductory paragraph giving a general discussion of the subject. On this first page of each chapter, space is provided in which the student must write out some eight to ten definitions of general concepts dealt with in the related chapter in the book. Such an introductory page can be varied artistically in many ways. The montage can be made to illustrate specific concepts or high points which must be defined. Or any essay question can be required covering the subject illustrated in the theme drawing.



a

FIGURE X. *Techniques of perceptual reinforcement in workbook design. The workbook drawing (b) is a modified reproduction of the original textbook drawing (a) used to motivate and partially reinforce attempts to write an essay on the subject of the drawing.*

b

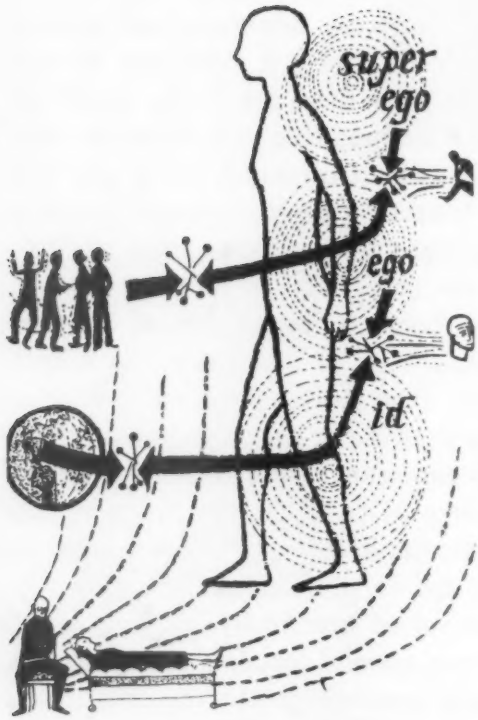


FIGURE XI. *A drawing illustration of psychoanalytic conceptions from the book is altered slightly for inclusion in the workbook and used as a visual reinforcer for answering a series of completion questions.*

Figure X illustrates how artistic illustrations are used to perceptually motivate the student and to reinforce his own efforts in answering essay and completion questions. An illustration used in the book is modified in some ways and reproduced in the workbook. Captions are eliminated and significant legends, used in the original illustration, are omitted. The student is then asked to write a short essay covering the subject related to the illustration. Or a series of completion questions on the subject may be prepared.

The diagram in Figure Xb, for example, is a modification of an illustration of an experiment on perceptual restriction. Legends and other details are missing, as compared to the illustration in the textbook (Fig. Xa). The student is asked to write a short essay on the experiment illustrated in the drawing. The drawing in Figure XI gives an example of relatively complete artistic support for the student in answering a series of completion questions. This drawing illustrates the interactions of personality indicated by the Freudian theory of psychoanalysis. The drawing is almost identical to the equivalent drawing in the textbook, except for some reduction in size and elimination of the caption. The related completion questions require the identification of the founder of psychoanalytic theory, the elements of motivation of behavior in this theory, the levels of personality, the dynamics of personality development, and the nature and effects of conflict between different levels of personality.

In the workbook, abstract drawings are sometimes substituted for representative drawings, or specific concrete illustrations are given of ideas illustrated by general drawings in the textbook. Sequential drawings in the textbook are put in different order in the workbook, and questions presented about the experiments or ideas are thus rearranged. Original workbook drawings or modified drawings from the textbook are used to set up matching questions and individual projects.

The general ideas followed in the design of workbooks are thus an extension of the scientific and artistic principles of textbook design. Textbook art is much more than just pictures or comic-book technique. It is a complex tool of non-verbal communication which can be applied in many ways to motivate and reinforce learning, and to promote transfer of learning from a reading context to the individualized work situation in study. Moreover, correlated art in textbooks is an indispensable instrument in advancing creative individual thinking in study and in reading. Impressionistic art deepens the processes

of creative thought in relation to human values, feelings, emotional tone, ideals, morals, and cultural factors. Representative drawing is the tool of classification, of demonstration, and of depicting processes, operations, and concrete examples. Abstract art, of which the bar and line graphs are functional derivatives, has all kinds of indispensable applications in textbook design—to give life to illustration and symbolism of all phenomena of interaction and dynamics, to create curiosity about unknown relationships, to demonstrate relativity of events, and to generalize at the perceptual level.

Procedures of Artistic Illustration

Many original ideas are being developed today about the procedures of improving books visually and artistically. Hogben (1959) has spoken of a "New Look" which can be achieved by the use of professional illustrators in the publishing business. Here the illustrator serves both author and publisher in producing illustrations suggested or laid out by the author.

We have ideas about the procedures of book illustration which differ from the above arrangement. In our opinion, the integrated artistic illustration of textbooks cannot be achieved by arranging commercially executed illustrations in relation to the printed galley. The book must be written from the outset around illustrations, and the demands of the visual art must be met in the revision and editing of the final manuscript. Just as an illustrated lecture demands timing and interplay of speech and vision, the visions and symbols of an illustrated book must interact in their effects to produce a uniform flow of verbal and non-verbal artistic communication.

Here are the steps in a program worked out in relation to this general theory of book design. The first draft of the book is written around illustrations prepared by the author. In making his preliminary illustrations, the author works with two ends in view—to get illustrations that will serve the artistic functions of the book and to achieve drawings that will communicate with the artist.

A basic secret of interaction of author and artist is the fact that their communication must be carried out largely at the non-verbal level, through the use of the author's drawings. The author must learn the varied uses of representative and abstract drawings and must know how to exploit the value of simple abstract designs in conveying the needs of artistic meaning to the artist. Thus from the first draft, the

manuscript is prepared to incorporate the illustrations as an integral or natural part of the communicative process of the book.

The initial plan for overall design of the book must take into consideration the number and variety of illustrations. After a plan is drawn up for the format, size, type, color, and special arrangements, and an agreement reached with the publisher, the artist-designer and the author can then proceed to finish the preparation of the book.

The artist-designer is given a copy of edited manuscript, along with the author's preliminary drawings for each chapter. Tentative artistic layouts specifying exact proportions are prepared from this material. Author and artist then discuss the desired illustrative effects for their layouts.

In order to achieve true artistic expression, the artist is left free at all times to execute layouts and finished drawings according to his own lights, as long as the general purposes of an illustration are not violated. The author can criticize a drawing as to accuracy or content, but not as to artistic effect, which is the domain of the artist. In this way, the artist can make a truly original contribution to the book and bring out novel illustrative approaches to subjects. He cannot make this contribution if he works according to specific directions.

After preliminary layouts are completed, they are checked for accuracy by the author. If the artist is doing an original job, his contributions will lead to revisions in the manuscript. The final manuscript will thus combine the verbal and visual conceptions of the author, the suggested changes by the editors, and the artistic additions by the artist.

The final drawings are prepared by the artist-designer or by contributing artists. When these drawings are done, the last stage of the work in page design is executed. The original design of the book, if effective, will expedite this process. As noted earlier, we developed the concept of the art column in the textbook, a marginal half-column that can be used to adjust both illustrations and captions to fit a given drawing to the text of the page.

The final page designing can be done from galley proof supplied by the publisher, or from typed manuscript. We have tried the latter procedure with some success, but also with some difficulties in keeping the page plan exact. The artist-designer uses a carefully-prepared manuscript which is typed so that the line length of the manuscript will correspond with the line length of the column of the book. He

sets up the page design and dummies from his own layouts and by computing the number of words per page from the typed manuscript. When the page dummies are finally prepared by the publisher, minor changes can be made in the manuscript to keep the text "in step" with the illustrations.

Figure XII illustrates some of the stages of evolution in the author's preliminary drawing, through the artist-designer's layout, to a final illustration of symbolism in dreams. Figure XIIa gives some idea of how the author attempted to achieve illustrative effects which could promote rapid effective communication with the artist-designer, but still not commit him to a specific concrete mode of execution of the subject. The abstract drawing gives the artist leeway to execute his own layout in terms of many different illustrative effects.

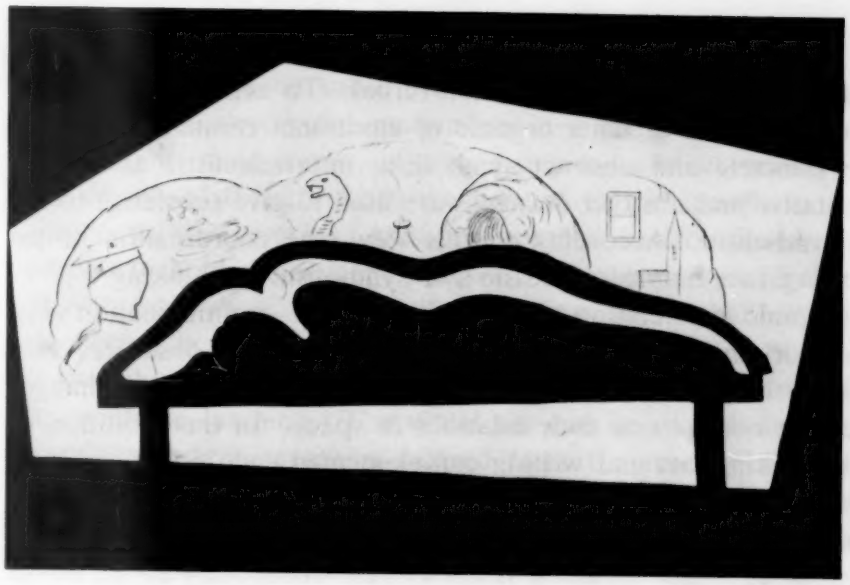
The layout of the artist in Figure XIIb is much more concrete and detailed than the original drawing of the author. The essential form of this drawing is followed by the contributing artist, whose production (Fig. XIIc) is a bizarre integration of pen drawing and the use of old engravings to achieve a special artistic effect.

The general conclusion from our experience covering the preparation of several hundred drawings by many artists, is that the essence of communication between author and artist is non-verbal. The disappointments which authors experience in trying to communicate with artists by verbal direction may be predicted from our theory that artistic communication is by nature not subject to verbal expression. Our experience is that the use of the author's drawings, prepared in both abstract and representative form, eliminates most of the problems of author-artist communication. The author's sketch is not enough. Poor art from the author probably means poor art in the book.

Theory of Textbook Design and Illustration

The systematic principles of textbook preparation just discussed constitute in effect a theory of textbook design. We have been interested in this theory, not only to guide us in preparing specific books, but to advance the scientific study of textbook design. Such study, aside from some observations to be reported here, has yet to be conducted in a systematic way.

Our general point of view was stated earlier. Books must be prepared according to principles of organic design. They must reflect and provide for various levels of natural behavior, symbolism and



a

b

(c) Final drawing by a contributing artist.

c

FIGURE XII. *Variation in artistic conception of a subject (dream symbolism). (a) Author's preliminary drawing. (b) Layout artist's drawing.*

communication, both verbal and non-verbal. To achieve such an integral confirmation of inner organic or emotional communication, as well as concrete and abstract symbolism, impressionistic as well as representative and abstract drawings are used to give substance to the verbal symbolism. According to this view, the coordination of art and writing is a natural expression of symbolism in thinking.

The organic interrelation of verbal and artistic communication is of historical origin. Art is ageless in its impact on the observer. Historically, writing was derived from artistic symbols—pictorial images representing objects and their relations in space. In the evolution of creative thinking, art and writing complemented each other and contributed to their mutual progress. Even in modern times, word symbols are learned first through their relations with objects and pictures. The reader can gain meaning from written words only in so far as these words create for him actual perceptual experiences or associations. Even the most advanced scientist depends on this connection between perception and verbal symbolism, and consistently uses visual illustration to support his use of words.

A primary principle of our theory is that artistic illustration helps define the general character of a book. The effectiveness of a book, textbook or otherwise, depends to a great extent on the reader's recognition of its unique individuality. Dictionaries and encyclopedias have their place, but most good books are not just collections of facts. They are organized symbolic systems, which reflect the significant relationships of events in nature. Visual art can sharpen the reader's awareness of a book's character by emphasizing vital meanings, pointing up certain values, and in general reflecting the author's attitudes toward his subject.

We have said that the motivation to read is in part perceptual motivation to explore, add to, and organize more completely the social and physical environment. The same motivation underlies artistic appreciation and artistic creation. Millions of people roam the museums of the world and intellectually roam through books for the same general purpose, to promote a more complete perceptual organization of the world at large and of their own needs and place in it.

Because of this common functional pattern of perceptual motivation in artistic appreciation and reading, verbal and artistic symbolism can interact in attracting, directing, and sustaining interest in the events and ideas of a book. According to our point of view, artistic

illustrations have no substitute in providing the essential conditions for sustained perceptual motivation in reading books. They direct attention to main events, segregate important observations, program the course of thought from the general to the specific or from the simple to the complex, and produce the environmental variations needed to hold the reader's interest over long periods of time. They provide, as it were, a natural, deep, organic, non-verbal base for verbal symbolism in writing.

Our theory also assumes a reinforcing effect of the artistic display on symbolic learning. The visual art can be used to confirm tentative ideas and perceptions derived from the reading material. This reinforcing effect serves to enhance understanding of the verbal symbols, and to improve retention of what is read. The artistic illustration acts as a goal in relation to the correlated passages in the text, and selectively increases the strength of the particular verbal ideas illustrated. The perceptual variety and richness provided by illustrations also promote learning at the symbolic level.

We have many decided notions about the way in which visual art can facilitate learning in reading. We believe there would be much better understanding of science, mathematics, and social human values if creative artistic illustration were systematically applied to books and teaching in these fields. We also feel that there would be a much wider understanding of foreign languages if all language books were illustrated by creative artistic displays. The widespread use of art in language training will promote understanding among different cultures. Art is not only ageless, it is also a universal form of language.

Our perceptual organization theory of reading finally proposes that artistic symbolism stimulates and implements creative thinking in the reader. Artistic illustrations provide a non-verbal base of communication which enriches insight into the meaning of written words, much as gesture and emotional expression add to understanding of spoken language. This interaction of the verbal and non-verbal material in books is based upon the correlation between equivalent forms of symbolism in art and in verbal expression. Specifically, representative, abstract, and impressionistic symbolism in artistic expression can be used most effectively with concrete, abstract, and emotional or motivational patterns of literary expression. This correlation enhances the reader's insight into the subjects thus illustrated, and increases the probability of his developing new relationships and ideas in thought.

Artistic illustrations can be created to interact effectively with any form or level of verbal symbolism.

The theory of learning underlying the principles of book design outlined here is in contrast to doctrines of specific-response reinforcement and conditioning, which have become so prominent in modern psychology. The main notion here is that man learns some few things through specific-response reinforcement, but that generally, and especially in reading, he has risen above this level of motivation and organization. We do not depreciate reinforcement as a factor in learning. We say that, in man, reinforcement is organized on a broader base and in terms of many more dimensions than the base and dimensions of the specific reflex response. We say that the primary dimensions of reinforcement in human learning, and especially in verbal and symbol learning, are related to perceptually organized motion, to perceptually structured emotion and need, and to the general activities of motivation in aural or visual recognition, discrimination, classification, and artistic representation. The phenomena of the picture book, of music, radio, motion picture, television, the various forms of human art, and of the development of language itself all define the significance of this point of view. Artistic visual design is tied in with reading on both the side of motivation and reinforcement, as we have shown. Artistic representation is the basic transitional process between manipulation and knowledge of objects and the verbal symbolization of these objects. Art is a primitive age-old indispensable means of human communication, which may be degraded by picture-books and poor television, but which will always have a vital role in human learning and education. The full significance of artistic design is yet to be discovered in modern education.

The theory of textbook design presented here, and the materials of the textbook and workbook evolved from this theory, may be employed as the basis of research on the nature and effectiveness of textbooks in teaching.

One of the main predictions of our theory is that students will react to an artistically illustrated textbook as being better organized than a book based largely on verbal dialectic and logical discussion. A systematic comparison has been made of an artistically illustrated book and an equivalent scientific textbook on human behavior consisting of a rigorous logical approach to the subject. Over 80 percent of 150 students in a beginning class in psychology in one of the out-

standing educational institutions of the country reacted to the illustrated textbook as a well organized book. The same reaction to the other one as a well organized book was considerably less.

We do not predict from the theory stated here that verbal memory and comprehension are increased on a short-term basis by artistic illustration. Experimental tests have shown that immediate verbal comprehension with and without illustrations is not significantly different. The prediction is made, however, that perceptual memory of the contents of a book is enhanced by artistic illustrations. We are at present developing electronic teaching machines to test some of these predictions about the relative comprehension and memory value of illustrated and purely written material.

The theory of artistic visualization of books described here may be extended to other educational media, such as the design of advertisements, industrial training books, and teaching devices. We apply the specific principles described here to the design and development of automated lecturing devices, made up from tape recorders and tape-recorder controlled filmstrip and slide projection devices. We have termed them "Audiovisumatic Teaching Devices." Besides presenting material to be learned, these training machines also ask the student questions in aural or visual form, which must be answered by punching an answer sheet. The correct response to the answer sheet controls further questions presented by the machine.

The audiovisumatic teaching methods represent a "new dimension" of visualization of lecturing and tutoring. These machines achieve for lecturing what artistic illustration achieves for book design, that is, controlled integrated visualization that may be varied in artistic function. They also open up a new approach to study and the development of aural-visual "workbooks" for the student's individual use. The integrated artistic visualization of material with both written and oral speech in teaching is now within the reach of every teacher.

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Prejudgments of Educational Television: A Study of Stereotypes*[1]

HANS H. TOCH

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A FIRST TASK of broadcast educational television is to reach viewers. People who do not tune in live out their lives unaware of the experiences that have passed them by. This may be tragic in the case of people who feel a strong need for what educational television has to offer but whose unfavorable preconceptions of "education" or of "educational television" preclude them from finding out that these needs can be met.

Conversely, there may be a problem with people who have exaggeratedly favorable preconceptions of educational television. Such a person, expecting technical achievements or types of programming which are not available, tunes in, and settles back in his chair, filled with faith and hope. The dissatisfaction and disillusionment that may result can make such a viewer an enemy of educational television for life.

Consider a third possibility: A viewer turns to his set, assuming that educational television consists of professional educators delivering pedantic, technical, academic lectures which are boring and difficult to understand. Nevertheless, he tunes in, because he has nothing else

* These data were gathered in a pilot project for a study of audience responses to educational television conducted by the Communications Research Center of Michigan State University for the Educational Television and Radio Center, Ann Arbor. The author is grateful to the director of this study, Malcolm S. MacLean, Jr., for invaluable assistance. Thanks are also due to Donald F. Kiel for supervising the content analysis of questionnaires.

[1] The term "stereotype," as first used by Walter Lippmann in his book *Public Opinion* (1922), refers to "pictures in the mind" which prejudge and predefine experiences.

to do, because he has an image of himself as thirsting for knowledge, because he wants to make a gesture in support of education, because he wants to prove that he is broadminded, or for any of an infinite number of possible motives. The program he selects is indeed a lecture, but it is generously supplemented with visual aids, the language is simple, the talk is interspersed with fascinating and relevant illustrations, the organization is meticulous. The speaker himself is animated, moves around (though not excessively), and smiles frequently. His voice is rich and modulated. The topic is one of general interest, with thought-provoking implications.

How will the viewer react? One possibility we could entertain is that the program changes his mind about educational television. He sees the program as we do. He abandons his unfavorable stereotype, and he substitutes a view based on his satisfying positive experience. Another possibility would be that he dismisses the program as an exception to the rule, and never tunes in again. But he has a third option: He can sit through the program, watch very carefully, and find his expectations fully confirmed. He notes that the program is in fact a lecture and that it has an academic setting; he compares the simple slides used by our speaker with the elaborate dramatizations of commercial documentary programs; he selects a few phrases from the script which have a relatively high Flesch count, to illustrate the abstruseness of the program; he points up the professorial appearance and delivery of the speaker, as compared with that of a professional announcer or actor. He introspects, and finds that he has not been entertained, elated, or moved.

The point is that stereotypes not only stand in the way of experience, but frequently shape and govern what we do perceive. If one is to communicate effectively, one must be aware of the stereotypes that one's communications are likely to encounter. Being forewarned at least provides the possibility of being forearmed. At worst, one can always give up, if the resistance is such that one could only increase it by foisting undesired communications on a hostile audience. Or one can prevent oneself from being needlessly defensive if one knows he is fully accepted to begin with. At best, one can modify communications so as to make them more palatable, or precede them with a campaign designed to bring the expectations of the audience reasonably in line with the offerings one is in a position to provide.

In the present study, the concern was with stereotypes held about educational television, in a setting (a) in which educational television

in the restricted sense of the term was not available in quantity, except to a minority of the television audience,[2] but (b) where educational television was about to become widely available, and in fact has become so since the time of the study.[3]

The inquiry was based on the assumption that despite the fact that the subjects would not have been exposed to much educational television, they could be expected to have some image of a program of this type. Since these preconceptions might color subsequent perceptions of educational television (or even preclude exposure), it was desirable to explore them in preliminary fashion.

Procedure

The information was gathered incidentally, from audiences assembled to view educational television programs in evaluation sessions. Prior to the start of the program, questionnaires were administered, containing a series of open-ended questions designed to explore the stereotypes of educational television held by the respondents. These questionnaires were subsequently content-analyzed.

A total of 148 subjects were used. The sample makes no claim to representativeness, but is more typical of the audience sought by educational television than college sophomores or military trainees. Most of our subjects (72 percent) were women; their mean age was 39.1, the range being from 15 to 75. Their mean years of schooling were 14.2. Fifty-seven of our subjects were housewives; next in number were clerical workers (23), professionals (19), students (17), business and managerial (10) and sales and skilled workers (8). The remaining six included unskilled workers, service workers, and one farmer. More than half the subjects (84) were married; two-thirds of these couples had children.

Except for five non-TV watchers, the subjects reported watching television relatively habitually. The most determined addict managed 64 hours in the seven days preceding the session—an average of nine hours a day. Twenty-nine of the 148 subjects owned a television set capable of receiving the then available educational television station, WKAR-TV; 51 subjects confessed never having listened to WKAR.

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[2] Michigan State University's television station, KWAR-TV, was available over a UHF channel, but relatively few sets in the area had UHF tuning attachments.

[3] VHF Channel 10 has recently started operating under the joint ownership of Michigan State University and a commercial telecasting corporation.

What did "educational television" mean to this sample? How did they feel about what they pictured as "educational television"? Where did they get their information? The present study found the following preconceptions and their sources existing within the sample.

Image of Educational Television

The first question asked the subjects was, "In your own words, how would you describe educational television?" It was not surprising to learn that most of the subjects thought of educational television as *something educational.* Thirty-seven of the subjects talked about educational television as a source of information, knowledge, or facts; another 30 had something more specific in mind, such as some type of subject matter; another 13 thought of educational television as being elevating, enriching, broadening, or illuminating; the remaining subjects gave answers which were evaluations rather than descriptions.

Several dimensions of television programs were mentioned as characteristic of educational television. The most common, as indicated, was subject matter. Science, health, music, mathematics, religion, news, and history were among the subjects specifically named. Format was brought up by some: skits, quiz shows, and panels were mentioned in this connection. Some respondents identified educational television in terms of the audience it reached or tried to reach. A number of respondents felt educational television was for everybody; others, however, mentioned specific groups, such as young people, those with little formal education, and families. There was good indication, in some cases, that respondents regarded educational television as being something for people other than themselves.

In order to gain a clearer idea of exactly what the respondents visualized when they thought of educational television, we asked them to "think of educational television" and to provide illustrations of "the sorts of programs" that came to mind. Their responses have been recorded in Tables 1 and 2. Table 1 provides a rank-ordered listing of subject matters they mentioned, and Table 2 lists specific programs cited.

The listing of subjects in Table 1 is of interest, if one remembers that comparatively few of the respondents had been exposed to educational television in the past. The listing, therefore, in part may represent a picture of what our respondents would *like* educational

TABLE 1—SUBJECT MATTER OF EDUCATIONAL TELEVISION AS VISUALIZED BY RESPONDENTS

Category	*Number of Times Mentioned*	*Rank Order*
Science, new developments, ideas	28	1
Travelogues, geography, outdoor life, going through other countries, exploration, travel	26	2
History	17	3
Current events, news	16	4
Medical, health	10	5
Music	9	6
Literature, English, fiction	8	8
Drama, plays	8	8
Education (general), classes	8	8
Farming, agriculture, conservation	7	10
Home economics, cooking	6	12
Panels, discussions	6	12
Industry, manufacturing	6	12
Trade, mechanical skills, crafts	5	14
Religion	4	16
Sports	4	16
Social problems, human understanding, other people's problems	4	16
Quiz shows	3	20
Safety, prevention	3	20
Mathematics	3	20
About school education	3	20
For children	3	20
Other (mentioned once each): Art, foreign visitors, child care, professions		

television to feature. A look at the most frequently mentioned categories increases this suspicion. Science, travel, current events, and health are fields which publishers, pollsters, and others have traditionally found to be of public interest. A comparison of the subject matters listed by our respondents with lists of programs available from the Educational Radio and Television Center shows a discrepancy between expectations and offerings.

Table 2 shows several factors at work in tracing the public's picture of the typical educational television program. One such factor is *availability*. Most of the programs cited were commercial programs accessible at hours commonly acceptable to most viewers. *Popularity* also enters into the picture. Among the programs readily available some are selected more frequently than others. This choice reflects back on the public's image of what a typical program is like. The third factor is a semantic one. Once programs have been viewed, for whatever reason, the viewer defines some of these programs as "edu-

cational," and others not. Walt Disney's programs, for instance, although both more *available* and more *popular* than some of the other programs listed in Table 2, are cited less frequently. Fewer people see these programs as educational television programs. Conversely, the miscellaneous listings show that some people apply the label "educational" with relative indiscrimination. In summary, the public image of educational television in part rests on the programs that strike people as educational out of the ones they select from the repertoire of quasi-educational, juvenile, documentary, and other programs available over commercial stations. Insofar as this image differs from that held by producers of educational television programs, this constitutes a liability.

What do people see as the purpose of educational television? The respondents were asked: "What do you think is the aim of the people who produce and put on educational television programs?" Table 3 contains a listing of the responses to this question. Again, the most frequently perceived purpose of educational television was that of teaching, in the sense of transmitting information.

Next in order are two classes of responses in which education is given a more liberal definition. In 19 cases, respondents saw educa-

TABLE 2—SPECIFIC PROGRAMS MENTIONED BY RESPONDENTS AS EDUCATIONAL TELEVISION PROGRAMS

Program	*Number of Times Mentioned*	*Rank Order*
Watch Mr. Wizard	18	1
University of Michigan program	10	2
Wide Wide World	8	3.5
Industry on Parade	8	3.5
Omnibus	6	5
You Are There	5	6
Walt Disney Presents	4	7
Bold Journey	3	8
Bell Telephone	2	11
Medic	2	11
4-H	2	11
Today	2	11
Meet the Press	2	11
Other (mentioned once each): Your Health, Stage 3, Camera 3, Dr. Spock, Agricultural Agent, Father Knows Best, $64,000 Question, This Is Your Life, Bishop Sheen, Loretta Young Show, Twenty-One, Sixteen, Youth Wants to Know, The Twentieth Century, NBC News, Lowell Thomas, Curtain Going Up, Mr. Sunday, PAA Travel Films		

tional television as aimed at improving people's minds or increasing their awareness; 13 respondents envisioned an even broader aim, such as the general betterment of mankind. On the other hand, 10 respondents saw a more narrowly defined educational function in educational television. They characterized it as an adjunct to formal education. It is interesting to compare these responses to the programs or subject matters the respondents saw as typical of educational television. It appears as if either the educational television source is regarded as aiming at educating the public in areas of greatest interest to them, such as science, foreign customs, and current events, or (and one gets this feeling from some of the responses) the aim of educational television is somehow felt to be the education of somebody else, such as persons requiring formal education but unwilling or unable to face a classroom.

TABLE 3—PERCEIVED AIM OF EDUCATIONAL TELEVISION

Aim	*Frequency of Mention (in rank order)*
TEACHING: educating, to inform about situations in other countries, to teach those who can't leave their homes, educate masses, to teach by vision as well as vocally, to teach [what is] not known or learned in school, to further educate those who aren't able to learn rapidly.	39
IMPROVING PEOPLE'S MINDS: enlightenment, to widen scope of knowledge, to show what is happening in world today, offset low level of commercial television.	22
GENERAL BETTERMENT: create better race of Americans, improve community and world conditions, to instruct, educate, and broaden the lives of ordinary citizens, to better equip our people to cope with and understand present problems.	13
AID TO EDUCATION: to make people understand our present situation in education field, to create interest in education's goals, aid those in field of education, to know how to steer children into lives of education.	10
ENTERTAINMENT VALUE: to please *all* the public, to entertain and hold your attention, keep people interested enough to keep their programs on and not turn to other stations, and to benefit something.	9
OTHER: produce more worthwhile programs; I think their aim is good, to reach more people and present programs in the best manner for all; to please the majority; to reach people that can't be reached otherwise; to use the time of people usefully by visual aids.	16
NO ANSWER:	21
TOTAL	130

Evaluation of Educational Television

Respondents were asked whether they thought that "educational television as we have it today is a good thing." Sixty-five voiced outright approval, 42 expressed approval with some reservation or suggestions for improvement, 28 said they didn't know (mostly because they had not seen enough educational television), and six refused to comment. Only four people asserted that educational television was not a good thing. Such unanimity only suggests that the question falls in the same category with one asking whether the respondents approved of democracy, God, apple pie, mothers, or—more relevant—education. What they approved of, it seems, was not so much educational television, with which few of them had any real contact, but rather, an idealized image of educational television.

To test this assumption, another question was asked which presented respondents with a hypothetical choice between an educational television and an entertainment television program. The question read: "Suppose that you have a television set that can get both an educational and commercial station. Tomorrow night at 9 o'clock you can either tune in Professor John B. Baxter for a discussion of 'Smoking and Cancer' or you can watch 'The General Motors Annual Variety Cavalcade.' You can watch one. Which would you choose? Why?" Both alternatives were deliberately made as attractive as possible, health ranking high in public interest, and variety shows representing favorite television fare.

Out of the 143 respondents, 76 indicated that they would choose Professor Baxter's cancer program, 54 selected the GM variety show, 11 evaded the issue by indicating that they would decide on the basis of merit or that their choice would depend on their mood. Two asserted that they would watch neither program.

Table 4 breaks down the two principal groups in terms of their stated attitude toward educational television. Although proportionately more of those who chose the educational program indicated unqualified approval of educational television, the same approval was voiced by the 37 percent (20 out of 54) who indicated that they would watch the entertainment program. And a larger proportion of those choosing the cancer talk approved of educational television with reservations. That such reservations tend to represent sophisticated approval rather than cautious disapproval is suggested by the

TABLE 4—ATTITUDE TOWARD EDUCATIONAL TELEVISION OF RESPONDENTS WHO INDICATED PREFERENCE FOR CANCER TALK OR VARIETY SHOW

	Proportion of Respondents Who Would Tune In	
	Educational Television Program (Cancer Talk) N=76	*Entertainment Program* (GM Cavalcade) N=54
Approval of Educational Television	49%	37%
Qualified Approval (suggested improvements)	38	22
Disapproval of Educational Television	1	7
Don't Know (not enough information)	8	34
No answer	4	0
	100%	100%

fact that nine out of 25 respondents who said that they had watched educational television recently did express such qualified approval.

The most pronounced difference between the two groups exists between the relatively small proportion of educational television choices and the large proportion of entertainment choices by people who said that they didn't know whether they approved of educational television. These "Don't Knows," it appears, are a group who—when it comes to educational television—couldn't care less one way or the other. They have nothing against educational television, to be sure, but no predispositions to explore it either. This group is not now a potential audience. Those who indicate approval of educational television but choose an entertainment program when faced with a choice can probably by and large be added to the group of nonprospects; these people seem to feel that educational television is a fine thing—but for someone else.

The two main reasons given for the choice of the entertainment program were (a) a desire for relaxation and entertainment ("by that time of day I want pure entertainment"; "a variety show would be more relaxing"; "when I watch television I like to relax and not worry about what might happen to us"; "I spend a great deal of time in educating myself and like television for relaxing") and (b) a lack of interest in the content of the cancer program or positive interest in the variety show. By far the reason most frequently given for choosing the cancer talk was a desire for information about cancer or health.

A sizable minority of respondents said that they would choose the cancer program because of their dislike for commercial television.

At least one factor of commercial television—the commercial—was explored in the questionnaire as a possible determinant of a favorable attitude toward educational television. This line of exploration did not prove promising because, although most viewers had some "gripe" about commercials (too many, too long, of uneven quality, and so on), only 20 out of 146 respondents expressed disapproval of commercials as such, and, on the other hand, only 17 respondents declared that they like commercials. There was no apparent relationship between these feelings about commercials and the expressed attitude toward educational television.

A Stereotype of the Stereotypes

The picture that seems to emerge from the data summarized above is of an audience composed of essentially three groups. By far the largest one of these groups includes people who have a favorable image of educational television. In most cases, this image is based in part on selective experiences with commercial programs of considerable interest to the public, and in part on wishful thinking. These people are *favorably disposed to their image* of educational television, but their image is unrealistic.

The logical prognosis in these cases would be disappointment in the event of contact. Contact, however, may never occur, since programs could be selected (as was the Baxter talk) on the basis of their interest; moreover, there is always the ready rationalization that "this program may not be of value to me, but it is good for some people." There are always the uneducated, the young, the Great Other—comprising all those in the population who do the things that are good for them, like eating spinach and reading good books.

A second (small) group in the sample comprise the relatively sophisticated admirers of educational television who can see its value, while aware of imperfections and needs for improvement. It is this group, with its attitude of benign tolerance and curiosity (as opposed to the enthusiasm and lack of realism displayed by the majority), which likely constitutes the immediate audience of the medium. Some of its members already have gone to considerable trouble to gain access to educational television programs.

The third group in the sample has a vague image of what educational television is, but this image is more in the nature of a remote, evanescent mirage than something concrete and of personal import. By and large this group sees educational television as educational, and education as something of little concern to themselves. They have no information about educational television, and seek none. Education is irrelevant, television is for entertainment, and never the twain shall meet.

An Operational Implication

It is customary in papers of this kind to end with a word of advice to the practitioner. Unfortunately we cannot conclude much from an investigation as modest in scope as the one reported here. Even if the picture we have drawn of the responses given by a few people to a few questions should hold for other people and other questions, it is only one aspect of the problem. All kinds of considerations loom larger in practice than the public image of educational television.

However, a dangerous discrepancy does seem to exist between what is perceived as educational television by at least some people, and what is produced and disseminated under that heading. At the risk of stating the obvious, we can draw two alternative suggestions from this. The first calls for some measures designed to change the public image. An information campaign—explaining educational television to the public, describing offerings, making explicit the audiences for which they are designed and the purposes they are intended to serve—might achieve this end. It might lower the expectations of some, thus forestalling disappointments; it might reach the potential audience among others who presently neither know nor care about educational television. It would provide a more reliable source of information about educational television than commercial programs and the individual's own interests and needs.

On the other hand, there is no *a priori* reason why those engaged in producing and disseminating educational television programs should not be governed (insofar as this may be compatible with their perceived aims) by the interests of their audience. Emphasis could be placed on subject-matter areas of greatest interest to the public, and possibly some measure of audience interest could also govern choices of format and methods of presentation. If educational television is seen by people as comprising programs of interest to them, there

should be some measure of transfer to programs which might otherwise be less popular. If, for instance, educational television offers programs in which people see immediate applications to their lives and pursuits, they may look for such applications in other programs where they are less apparent.

What we have suggested is that the two alternatives open to the practitioner are: (a) to bring the public image of educational television closer to educational television offerings and (b) to bring educational television offerings closer to the public image. Either course of action presupposes further exploration of popular stereotypes of educational television. Groups holding different images, such as those discussed above, not only have to be sorted out, but identified, so that they can be most appropriately reached. Mohammed cannot move to the mountain nor can the mountain be transported to Mohammed, without a topographic map of the intervening terrain. The above is intended as a rough, two-dimensional outline of such a map.

Development of an Audience-Tailored Film

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EVERY MOTION PICTURE is intended for a particular audience, and in that sense, every film is audience-tailored. More precisely, the film designer has a perception of the audience for which he intends the film, a perception based in part on his knowledge of the characteristics of his audience.

The designer's knowledge of his intended audience, as well as his skill in utilizing this knowledge in the development of the film, is likely to influence the effectiveness of the product. A film may be effective even though the designer is unable to actually verbalize the basis on which he developed it. However, when a film is to be used in communication research, there should be real advantages in delineating (1) those audience variables which may interact with the film, and (2) the procedure utilized in the development of the film.

This article will be restricted to that type of film intended to mediate a change in opinion. A description will be given of a procedure of measuring and analyzing opinion, and of utilizing the results in the development of a film. The procedure will be exemplified by a description of the development of a specific film, *The New India.* A discussion of the procedure will be reserved for the final section.

The New India was intended to mediate an opinion change among university students with respect to India. For simplicity the only audience variable utilized in this study was opinion concerning India. The content of the film was determined essentially by this pre-film opinion. The procedure involved the determination of the number of relatively independent opinion dimensions with respect to India,

and the development of a film with as many sequences. These two steps—determination of the opinion dimensions and development of the film—will be elaborated upon in the next two sections.

DETERMINATION OF THE OPINION DIMENSIONS

Since the film was intended for use at the university level, the opinions on which the film was based were solicited from students at the University of California at Los Angeles. Opinions were obtained during the spring semester of 1958 from 252 respondents enrolled in two classes in introductory psychology—one at the freshman level, the other at the junior level—and two classes in audiovisual education.

The opinion dimensions were derived by factor analysis of the responses to an opinion questionnaire. This questionnaire, itself a film, will be referred to as the "opinion film-questionnaire." Each item in the opinion film-questionnaire consisted of a film scene, a narrated question, and an abbreviated repetition of the narrated question printed on a mimeographed form in the student's hand. Each scene lasted about 15 seconds, during which time the narrated question was asked. The respondents were asked not to record their answers until the scene was finished. At the end of each scene a title, ANSWER ITEM__, appeared on the screen in black letters. The remainder of the screen was illuminated by the 16mm projector, allowing the respondents to see their mimeographed questionnaires by reflected light. In some rooms this light was supplemented by subdued and continuous overhead or natural light. The projection time of the title after each item gave the respondents about 15 seconds to answer the question.

An example of the 69 multiple-choice items intended to elicit response shows a woman baking bread in an outdoor oven in India. The narration asks, "Do you think this woman would continue to cook bread in her traditional way if she were given a modern stove?" At the end of the scene the cue ANSWER ITEM 34 appears on the scene directing the student to the matching question on his answer sheet: "Would woman continue to cook bread in traditional way if given modern stove? (a) no, (b) yes."

A factor analysis of the responses, described elsewhere (6), revealed 10 common factors. An attempt was made to name each dimension according to the content of those items representative of the dimensions (items whose loadings for the factor were as large as .30). Each dimension and its content is given in Table 1.

TABLE 1—CONTENT OF EACH DIMENSION ARISING FROM THE OPINION FILM-QUESTIONNAIRE

Dimension	*Content*
1. Realism	Realistic India vs. exotic India
2. Equality	Equality in intellectual, ability, and social areas
3. Government	Form; foreign relations; orientation toward caste
4. Hinduism	Basis; effect on India; comparison with Western religions
5. Underdevelopment	Causes; effect on U. S.
6. Adaptability	Ability to adapt to industrial technology
7. Progress	Rate of change; compatibility of new with old
8. Discernment	Functional vs. physical aspects of scenes
9. Aid	American aid to recalcitrant India
10. Overpopulation	Rate of increase; importance of control

Two of these dimensions (realism and discernment) appeared to reflect general perceptions of India, but the remaining eight appeared to indicate opinion dimensions with respect to specific content areas. These eight opinion dimensions formed the basis for the development of the film.

DEVELOPMENT OF THE FILM

The object in developing the film was to create a stimulus material which, presumably, would mediate opinion change in a desired direction. The development of the film required the determination of (1) the content areas to be included, (2) the order of the film sequences, and (3) the type of appeal to be employed. These three aspects will be discussed separately.

Content Areas

Each of the eight opinion dimensions emerging from the responses to the opinion film-questionnaire suggested a content area of the same name to be covered in the film. The eight areas were highly similar to those arising from a survey by Balasundaram in which he undertook to determine what topics American college students considered important for their understanding of India (1). The Balasundaram list also included the content areas of history and political neutrality. Presumably these two areas would also have emerged from the film-questionnaire had pertinent items been included. Therefore, it was decided to incorporate them and thus to cover 10 content areas in the film. This example indicates the necessity of selecting items from the entire opinion domain.

Before constructing the film, it was necessary to decide on the orientation (approach, thesis, slant) to be followed for each content

area. This orientation was coincident with the direction of desired change in opinion. These content areas are described elsewhere (6), but Table 2 summarizes each content area and its orientation according to the order in which it appeared in the film.

TABLE 2—ORIENTATION FOR EACH CONTENT AREA COVERED IN THE FILM

Content Area	*Orientation*
1. History	History leading to independence and partition
2. Underdevelopment	India's underdevelopment due to historical circumstances
3. Government	India is a democracy opposed to caste
4. Adaptability	India is showing adaptability to industrialization
5. Progress	India is showing progress in many areas
6. Equality	India is intellectually equal to West
7. Aid	American aid to India also benefits the U. S.
8. Overpopulation	Overpopulation problem has been overexaggerated
9. Hinduism	Hinduism is congenial to modern technology
10. Neutrality	Understanding India's neutrality benefits the U. S.

Order of Film Sequences

The order in which the content areas appeared in the film (as shown in Table 2) is calculated to achieve a maximum effect. McGuire (8) found that a communication which began with those arguments engendering the least opposition had greater total effect than a communication in which the arguments were ordered in reverse. An attempt was made to construct the film so as to capitalize on the more favorable order. Frequency distributions of the film-questionnaire items within each opinion dimension were evaluated; each dimension and its content area was ordered according to the degree of opposition with respect to the film orientation. Thus, the order of the film sequences, like the determination of the content areas, was eventually based on the responses to the film-questionnaire.

One film sequence was constructed for each of the 10 content areas. The message was carried essentially in the sound track, but an attempt was made to select scenes which confirmed the arguments advanced in the narration. Throughout the film, the narration catered to the opposition in the hope of minimizing defensiveness. The length of each sequence was determined more or less by the extent of the opposition—the greater the opposition, the more extensive the treatment.

Type of Appeal

The type of appeal used in the film tended more toward the intellectual rather than the emotional, the decision being based on three considerations. First, it would have been more difficult to support an emotional appeal with the scenes available since they contained little dramatic value, at least in the theatrical sense. Second, the film-questionnaire was intended to yield opinions with respect to India, and as such, gave little information about the respondents' emotions toward India. Finally, there exists no critical evidence of the superiority with respect to opinion change of the film employing an emotional or dramatic appeal over that employing an intellectual appeal. Of four film studies (2, 3, 5, 7) showing no significant change in opinion, three employed dramatic films, whereas only one used films with intellectual appeal. Of four studies (4, 9, 10, 11) reporting boomerang effects (effects opposite to those anticipated), three utilized dramatic films.

DISCUSSION

The procedure just described conforms to the general process involved in the production of every film intended to mediate an opinion change. Every such film reflects the designer's perception of (1) the opinions held by the intended audience, and (2) the manner in which the film material might best be presented so as to modify these opinions. These perceptions are not necessarily correct, and the designer may not verbalize them or even be conscious of them. With regard to the study described, the two points above correspond to the determination of the opinion dimensions and to the development of the film.

However, the procedure involved in the development of *The New India* employed three operations not generally utilized in film production: (1) use of the film-questionnaire, (2) multivariate analysis of the responses, and (3) utilization of the quantitative results in the determination of the film sequences. The implication of these operations to film production in general is worth discussing, but inasmuch as no critical evaluation was made of them, the discussion cannot be in rigorous terms.

The opinion film-questionnaire employs verbal responses, and in this respect is no different from the conventional opinion questionnaire. The difference is in the enrichment of the stimulus material to which the responses are made. Since each question is an audiovisual presentation, responses may reflect more accurately the reactions which

would occur to the completed film. However, films have not been used extensively in measurement, and little is known about the relative characteristics of the film-questionnaire when compared with the conventional questionnaire.

Multivariate analysis of opinion items is being utilized more extensively now that computers are available generally.* Such analyses usually result in more than one opinion dimension, especially with respect to complexly perceived objects like Russia, the church, socialism. The implication seems to be that the film designer intending to mediate a change in opinion should concern himself with the interpretation of these dimensions, their interrelationships, extent, and strength.

Utilization of statistical results in the determination of film structure (number, length, and order of sequences) should carry with it the usual advantages of specification. For instance, film specification increases the objectivity with which the film could be varied systematically in the test of an hypothesis, and allows different experimenters to discuss film stimulus material in less ambiguous terms. In these days when meaning is so intimately related to operation, specification is definitely in step with the tenor of the period.

While the procedure described in this article may be applied to any group, it is far too simple to result in a maximally effective film. A more elaborate approach would involve the measurement of other audience variables which might be related to opinion change. Also, opinion change from tentative versions of the film should be analyzed for clues allowing the preparation of a more effective film. Evaluation of all such procedures depends on the validity of the measure of effectiveness; film design and effects measurement are intimately related.

Finally, the procedure described in this article is conceived as an integral part of film production. The term "pre-production planning" seems inapt, for it appears to imply that it is possible to plan a film before shooting begins so that the final product will have a predicted effect. While it may be comforting to believe that the effectiveness of a film can be so predicted, there is little evidence to indicate that

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* The calculations implied in this article were performed on SWAC, a computer operated by Numerical Analysis Research, UCLA, and supported in part by the Office of Naval Research. The author also wishes to acknowledge the programs made available for this study by Andrew L. Comrey, Department of Psychology, UCLA.

such prediction has been achieved to any great extent: for every film study whch confirms predicted opinion change, there are often 10 studies in which confirmation is lacking. Planning is desirable at every stage of production.

SUMMARY

Since every motion picture is intended for a particular audience, every film is audience-tailored according to the perceptions of its designer. However, when a film is to be used in communication research, there are advantages in delineating the procedure employed in the development of the film.

An example was given of the development of a film intended to mediate a change in opinion. The procedure involved (1) the use of an opinion film-questionnaire, (2) multivariate analysis of the responses, and (3) the application of the statistical results to the design of the structure of the film. These three operations were discussed in terms of their implication to communication research.

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COMMUNICATIONS PROGRAMS IN HIGHER EDUCATION

*Donald P. Ely**

THIS ARTICLE IS A PREFACE to an intensive study of the organization and development of communications programs in higher education which is currently in progress by the author. The scope of this discussion includes the identification of institutions where programs exist, the administrative organization of each program, the degrees offered, and an analysis of the contributing fields.

In an address before the General Education Section of the Association for Higher Education in 1956, James D. Finn said that there was no doubt that the concept of communication had become "a seminal, organizing concept that runs like a series of arteries throughout the body of most of the social sciences, some of the physical sciences, and even here and there in the humanities." [1]

There have been other expressions of concern over the steady development of communications programs. People affiliated with the audiovisual field have attempted to estimate the direction of this movement.

The Department of Audiovisual Instruction of the National Education Association first expressed its concern about the development of communications programs in higher education when a "rump" session was held at the 1956 annual meeting in Detroit. Gordon A. Sabine, dean of the College of Communication Arts at Michigan State University stated the general tenor of this meeting:

1. There are a dozen or so departments and divisions and schools with the word communication or communications in their titles—yet no two of them appear to be doing anything like the same thing.

2. We have organized curricula in communications, but we have not yet identified what it is that will be our unique body of subject matter.

3. We have only the barest scattering of human beings broadly trained in communications, but from too many institutions over the nation we hear rumblings about new schools and departments of communications, to be organized not because there are highly skilled leaders in the field but because there is apparently some social virtue in being on the bandwagon—even

[1] Finn, James D., "Needed—A New Concept of Communications in General Education," *Current Issues in Higher Education 1956*, Association for Higher Education, National Education Association, Washington, D. C., p. 226.

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though one has no ticket and even though neither passenger nor driver knows where this particular bandwagon is headed.[2]

The fact is that there are at least 20 institutions of higher education in the United States that use the communications label to denote an interdisciplinary approach to the mass media. Schools, colleges, divisions and departments of communications have been established with curricula leading to baccalaureate and graduate degrees in communications.[3] During the 1958-59 academic year, three institutions of higher education established interdisciplinary programs in communications. They are: the Department of Communications at the University of Idaho; the School of Communications at Oklahoma State University and the Annenberg School of Communications at the University of Pennsylvania. There has been a slow, steady increase in these interdisciplinary programs in higher education at the rate of one or two a year since the first program appeared at Teachers College, Columbia University in 1943.

The information presented here is based on responses to a questionnaire completed by the chief administrative officer of the communications programs at institutions of higher education where such programs exist. When questionnaire responses were not available, information from current catalogs and brochures was used.

Here we are concerned with the communications programs which give evidence of a coherent arrangement of courses and/or administrative patterns so as to shed light on communications as an interdisciplinary approach. For a program to be included in this analysis, the academic portion of the program must lead to the baccalaureate and/or advanced degree in communications or show evidence that an interdisciplinary approach is being followed.

Even within the confines of higher education it is necessary to define communications programs carefully or there is likely to be some confusion between the approach to communications which identifies itself with the traditional fields of English and speech in elementary college courses and the approach which studies the social institutions and the processes of communications in society. This article deals with the latter.

The institutions which meet the above limitations are listed in Table 1. The exact name of the unit or degree program is also noted. While all the programs mentioned are interdisciplinary in approach, there appears to be very little agreement among them concerning administrative placement or nomenclature. The most common designation is a "school" (6 institutions) and next a department within a liberal arts college (4 institutions). Label by major program emphasis occurs in four cases where the program is within a traditional school, for example, a school of journalism. There are two which carry the "college" status and one has a "division" title. Committee, group, and program are labels used in three different institutions where various departments, divisions, and schools contribute to a single program.

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[2] Brodshaug, Melvin and MacLean, Malcomb S. Jr., "Communication Programs in Higher Education," *Audiovisual Communication Review*, Winter 1957, p. 395.

[3] There are other institutions of higher education who are involved in communications which are not included within the scope of this discussion. They are, for example, the Center for Communication Sciences at the Massachusetts Institute of Technology and the National Project in Agricultural Communications at Michigan State University.

TABLE 1.
COMMUNICATION PROGRAMS AT INSTITUTIONS OF HIGHER EDUCATION

Institution	Administrative Unit or Program	Degrees				Contributing Areas							
		Undergrad	1st Year Grad	Adv. Grad	Ed	Journalism	Radio-TV	AV-Cinema	Speech	Drama	Public Relations	Advertising	Photography
Boston University	School of Public Relations and Communications	BS	MS			X	X	X			X		
University of Chicago	Committee on Communication, Division of the Social Sciences		MA										
University of Florida	School of Journalism and Communication	BS				X	X				X	X	
University of Idaho	Department of Communications, College of Letters and Sciences	BA				X	X	X					X
University of Illinois	College of Journalism and Communication	BS	MS	PhD		X	X					X	
Indiana University	Area of Audiovisual Communications, School of Education	BS	MS	PhD	EdD	X	X	X					
State University of Iowa	Ph.D. in Mass Communications School of Journalism			PhD		X	X						
Michigan State Univ.	College of Communication Arts	BA	MA	PhD		X	X	X	X	X	X	X	
New York University	Communication Arts Group	BS	MA	PhD	EdD	X	X	X	X		X		
University of North Carolina	Master of Arts in Communication Dept. of Radio-TV and Motion Pictures		MA				X	X					
Oklahoma State University	School of Communications	BA BS				X	X		X	X	X	X	X
Univ. of Pennsylvania	Annenberg School of Communications		MA				X	X					
University of Southern California	Division of Communications		MA	PhD		X	X	X	X	X			
Southern Illinois Univ	School of Communications	BS	MA			X	X		X	X			X
Stanford University	Department of Communications and Journalism, College of Humanities and Sciences	BA	MA	PhD		X							
Syracuse University	Ph.D. in Communications, School of Journalism			PhD		X	X				X	X	
Teachers College, Columbia University	Program in Communicatons and the Communication Arts		MA	PhD	EdD		X	X	X	X			
Temple University	Department of Communication, School of Business and Public Administration	BS				X	X						
Univ. of Washington	School of Communications	BA	MA			X	X				X	X	
University of Wisconsin	Ph.D. in Mass Communications, School of Journalism			PhD		X							

The level of the interdisciplinary degree in communications is different from institution to institution offering academic programs. This is not peculiar to the communications field since many institutions of higher education offer degrees at various levels depending upon the number and stature of the faculty and the accreditation to offer specific degrees. There is, however, a difference of opinion among the people who are responsible for communications programs regarding the level of the communications degree. This is resolved, for the most part, by stating the vocational objectives for which the student is being prepared. That is, those institutions which offer the bachelor's degree feel that their potential fields of employment rest in the operational aspects of the mass media. The candidates for the terminal master's degree usually aim for the management positions in industry and government. Some aspire to teach English or the social sciences in the secondary school if their background is in education. The doctorate degree, usually the Ph.D., prepares people for research and teaching positions in higher education as well as for research positions in the media industries and government. The Ed.D. with emphasis in communications leads people to teaching and administrative positions in all levels of education.

A summary of the degree programs in communications is presented in Table 2.

The traditional academic areas which contribute to the interdisciplinary approach to the study of communications are indicated for each institution in Table 1. None of these departments or areas seem to lose their identity even though they are theoretically absorbed as a vital part of a communications program. It is still a very common procedure for the student to select one area for major emphasis and then to broaden his communications perspective by selected courses from the other traditional areas which relate to his vocational objectives.

TABLE 2. DEGREE PROGRAMS IN COMMUNICATIONS

Degree(s)	*Number of Institutions Offering Degree(s)*
Bachelors	12
Bachelors Only	4
Masters	13
Masters Only	3
Bachelors and Masters	3
Doctorate	10
Doctorate Only	3
Masters and Doctorate	3
Bachelors, Masters and Doctorate	5

It is interesting to note the frequency of certain areas contributing to the overall program. The backbone of the communications program in higher education would appear to be journalism and radio-television, both of which are found in 16 programs. Following closely behind are audiovisual-cinema [4] (9 institutions), speech (6 institutions), advertising (6 institutions), public relations (7 institutions) and drama (5 institutions).

Even though the frequency of several areas within the communications program seems to indicate which fields have established stakes in the communications claim, this does not tell the complete story. The question of emphasis

[4] In some cases cinema (motion picture production) is a part of the audiovisual program, sometimes it exists by itself. Audiovisual education, on the other hand, is usually allied with the school of education for academic purposes. Since communications programs are more commonly allied with the mass media of communications and hence are outside the school of education, the focal point here is the cinema aspect of the audiovisual field and not the relationship of communications to the field of education.

or leadership crops up. This question can be answered by noting who was responsible for establishing the program, who is the dean or chairman of the program, or what discipline is the "home base" of the program in the academic structure of the university. If we analyze the 20 programs in this light we find seven institutions which are journalism-centered; two in which radio-television exert the leadership; one which is led by audiovisual, one by speech, one by the social sciences, one by English, two by business; and seven which are difficult to identify. In a true interdisciplinary program it should be difficult to identify any one contributing field leading the others.

As the existing communications programs are studied it can be noted that there are two academic cores contributing to their makeup. One, which we shall call the *contributing areas,* consists of traditional academic areas or departments which existed by themselves or within another administrative organization prior to the communications amalgamation. These have been brought together as an interdisciplinary combination and now exist as areas within the communications program, for example, journalism, radio-television, audiovisual-cinema, and so on. The other core we shall call the *supporting areas.* Here we find the traditional fields of psychology and the social sciences. Other disciplines also are supporting areas in various institutions. English, library science, and education were reported to be in this category. These supporting areas usually offer courses which contribute to the communications programs but the areas or departments are not administratively placed within the scope of the official communications program. This illustration points up the fact that the communications program is usually more of a debtor within the university than it is a creditor. More students go "outside" the program for courses to support their communications objectives than come into the program for courses to support another academic program.

Summary

There has been a steady growth of communications programs in higher education. These programs are interdisciplinary approaches to the study of the mass media. Even though there continues to be active concern and questioning regarding the spread of these programs, they continue to be established and will continue to grow, if experience is any indication.

There is little consistency in the administrative patterns of organization. The administrative labels cover the gamut from departments and loosely organized committees to schools and colleges.

It is possible to find institutions which offer bachelor's, master's and doctorate degrees in communications, the degree being dependent upon the institution.

There are many traditional academic areas represented in the various programs but the three most common areas are: journalism, radio-television and audiovisual-cinema. All programs seem to draw heavy support from courses in the social sciences.

This discussion leaves many unanswered questions. What are the forces which caused programs to be established? What is being accomplished under the communications label that could not otherwise be accomplished? How do the objectives and curricula compare? These and other questions will be answered in subsequent articles.

ARMY TELEVISION RESEARCH ACTIVITIES

*Joseph H. Kanner**

SINCE 1951, the U.S. Army Signal Corps has sponsored or conducted television studies aimed at developing the medium for military teaching and communications purposes. At present, 10 Army installations use television for teaching and five more are scheduled for TV instruction within the next year. Although many major questions have been answered—enough so that most training needs can be handled over television—study continues on how the newer aspects of TV can further contribute to its effectiveness for teaching.

For the past year, a major activity has been a comparative study of the teaching effectiveness of color and monochrome television. The Signal Corps operates an experimental mobile color unit which consists of three color cameras and associated equipment mounted in an air-conditioned van. The extensive use of transistors makes these cameras considerably lighter than their predecessors, although they remain bulkier than standard image orthicons. This unit has been used to conduct the study both at the Signal School, Fort Monmouth, and the Ordnance Guided Missile School, Huntsville, Alabama.

At both of these installations, a wide variety of subject matter was selected. It represented materials, which on *a priori* basis, might not be expected to benefit from color, such as a lecture on Ohm's Law, aids in learning to read resistors, and so on. Groups of trainees equated for aptitude were simultaneously taught by the same instructor. One group saw the instruction over color receivers, the other over monochrome receivers. This design eliminated possible variance attributable to time of day or different instructors.

It is expected that this study will be the most definitive carried out on the role of color in learning, and, whatever the results, they will be based upon rigid controls and an extensive sampling of subject matter. The study is nearing completion and will be reported to readers of this journal.

Video tape recorders are now being procured by Army television users. A study planned for the Signal Schools, Fort Monmouth, and Fort Gordon, will evaluate the application of video tape to the training of new instructors. It is believed that the immediate playback feature of video tape provides an opportunity for insight into errors and deficiencies by new instructors not possible with other existing methods.

Finally, there is a study in planning stage to further pursue the use of television for teaching problem-solving behavior as represented in the trouble shooting of electronics equipment.

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"A MONUMENTAL PIECE OF WORK"

*Wesley C. Meierhenry**

A review of *A-V Instruction Materials and Methods*, by James W. Brown, Richard B. Lewis, and Fred F. Harcleroad (McGraw-Hill, 554 p., $7.95).

THE AUDIOVISUAL FIELD is a rapidly developing area where new philosophies and directions are evident. The authors, who have attempted to give attention and meaning to these developments, furnish a clear and succinct picture of the purpose of their book in the preface from which these three paragraphs are quoted:

"This book was written to help prospective and practicing teachers become better acquainted with the broad range and interrelated uses of audiovisual instructional materials and techniques. Throughout the text the term 'audiovisual instructional materials' is broadly interpreted to comprise the many substances and sounds which play important roles in learning. The continued preoccupation of our schools with things verbal has tended to obscure adequate recognition of the principle that learning is most effective when generalizations and abstract concepts are developed on the basis of rich experiences with concrete realities. These are the realities of things that are heard, seen, felt, smelled, manipulated, organized, assembled, or taken apart during learning; they are the things that are ultimately named, labeled, talked about, evaluated, criticized, read about, or thought about during learning; and they are the things remembered or recalled for pleasure or for use after learning.

"It is to be remembered, however, that there can be no guarantee that students will grow or change desirable ways simply because learning experiences are conducted at a concrete level, nor is there a magic formula for insuring desired educational results through mere use of instructional materials. The key and the ultimate responsibility for creating a favorable learning environment and achieving desired educational goals rest squarely with the classroom teacher. There is no substitute for the teacher's

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ability to plan and organize learning experiences and to select, adapt, and relate instructional materials appropriately in learning experiences. Teacher guidance and insight, coupled with student effort, are needed at every step of the way.

"A major and consistent emphasis of the text is the principle that instructional materials are used not in isolation but interrelatedly. Multipurpose uses of materials are stressed: Charts are useful in demonstrations; tape recordings of discussions afford opportunities for further discussion and later analysis; field trips stimulate interest in making collections; films or filmstrips can provide necessary background to help students determine what is important to observe on such trips; encyclopedias, reference books, textbooks, pamphlets, and supplementary books provide essential data in organized forms which students need to solve problems growing out of still other learning activities. When teachers use varied approaches to learning problems and use materials which strengthen and build upon each other rather than compete, classroom learning activities become more interesting and understandable to the student."

A-V Instruction Materials and Methods places emphasis on the communications point of view. The authors develop the theme that the problem of communication is the basic problem in education. Because of technological and sociological changes in our society it is imperative that a wide variety of experiences be made available to the individual learner in order that the purposes of his education be fulfilled.

In harmony with this theory the authors develop the concept of instructional materials rather than simply audiovisual materials. As evidence are the chapters on "Resources for Learning" and "Printed Text and Reference Materials." These chapters along with others are designed to show that the modern teacher uses a wide variety of experiences provided by printed materials as well as audiovisual materials and that these collectively are thought of as being instructional materials. A good case is made for having them all in the same center or at least in close proximity.

The book is developed into rather unique divisions of "ready-made" materials and "creating" instructional materials. These divisions are helpful from several points of view. The first is a philosophical one that educators must take into account. It is the question as to whether or not classroom teachers and school systems generally have the time, energy, and/or skill to develop their own teaching materials. There are many people who feel that the expansion of new knowledge along with the other complexities of teaching make it necessary to rely more on commercially prepared materials and less on local production. The way the authors have divided their material draws attention to this question.

A second purpose served by the division is simply the convenience of using the book. One finds all of the how-to-do-it suggestions in roughly the last 300 pages.

The chapters have a rather standard format. The first section generally deals with the advantages and disadvantages of the material under discussion. The second section pertains to the use of these materials in instruction, and the final part of the chapter identifies the sources for the materials as well as evaluative procedures. This format

seems to the reviewer to be basically sound methodologically.

In looking at the book as a whole there are four major observations the reviewer would like to make. First, the book contains a mass of material which has been carefully boiled down to the bare essentials required for understanding. In some ways the book contains too many facts for anyone to assimilate and yet the material specialists, curriculum supervisors, teachers and others who use it will find all parts useful at sometime or another. The authors have performed a herculean task in gathering together and reporting so many facts about the instructional materials field.

A second observation is that the authors have developed a tremendous list of resources to which classroom teachers and others in education can write for additional materials. This listing, which should make the book invaluable, is found in practically all chapters, but the chapter on "Free and Inexpensive Materials" is an outstanding example. A third noteworthy point is the great number of helps on "how-to-do-it." All of the chapters dealing with "Creating Instructional Materials" are examples, but the chapters on "Constructing" and "Real Things and Their Models" are excellent. The book goes further than most in describing the specifics of construction and development of materials.

The fourth point deals with the reference section on the operation and maintenance of standard pieces of audio-visual equipment which is unusually comprehensive. The section on duplicating processes and equipment is not found in most audiovisual texts. The glossary is one of the first ambitious attempts to define terms frequently used in the audiovisual field and should prove to be helpful in a number of contexts.

As is true with every volume there are certain aspects of the book which are less desirable than others. One of these is the great mass of material which, in the opinion of the reviewer, is not a serious matter. By careful selection and emphasis those who use the book will quickly learn how to concentrate on the aspects most helpful to them and to give less attention to the multitude of details not immediately useful.

The second problem pertains not to the content but to the way in which the book was put together. The outside column on each page never carries the basic text but only illustrative and reference material to which it is related. One finds himself, therefore, either reading only the text and forgetting the illustrations or taking more time than should be necessary to relate the illustrations to the text. It seems unfortunate to the reviewer that these technicalities of book-making should have interfered with the readibility and the clarity of the text.

All in all, *A-V Instruction Materials and Methods* is a monumental piece of work and will no doubt find increasing acceptance among instructors of AV classes, as a reference work for administrators and supervisors, and as a handbook to the classroom teacher.

■ TAPE RECORDINGS

Gibson, Rodney E. (Mrs.)

"The Tape Recordings Experiment Is Expanded in Westside Junior and Senior High Schools, Omaha, Nebraska"

Bulletin of the National Association of Secondary-School Principals 43:49-72; January 1959

Purpose: To study the effectiveness, costs, savings, problems, and possibilities of using tape for teaching spelling and Conversational Spanish.

Procedure: Tape instruction was compared with regular instruction. Standardized tests — locally constructed written and oral tests—were used. Analysis of covariance was used to correct for differences in groups. A number of experimental comparisons were made.

Results: In seventh grade spelling the tape method surpassed the teacher-taught method when the criterion was the number of words written correctly. The two methods were equally effective in recognition of misspelled words. No exceptional likes or dislikes developed. Large group spelling instruction at the eighth grade level showed similar results. Achievement of sixth and seventh grade students in Conversational Spanish taught by a teacher who used tapes but knew no Spanish was equal to that of other students taught by a Spanish teacher. More discipline problems were encountered in a large group session than in separate room instruction. It was determined that one Spanish teacher can supervise 20 classrooms receiving tape instruction, teach two high-school classes, make tapes and do repair work. A 10-watt amplifier is adequate to supply sound to three large rooms. A mimeographed manual on Conversational Spanish can be used instead of textbooks for tape instruction. Fifteen to 20 rolls of 1800-foot tape are needed for each year's Spanish course (in Omaha they are putting a complete set in each building). Two to four teachers can use a single tape recorder effectively. However a stand-by recorder is required for each school. Tapes permit savings in textbook costs, and give teachers more time for increased supervision and individual instruction. A problem encountered was that too few tapes are currently available to do the entire teaching job, and the making of tapes was found to involve many factors. However, the use of tapes is expanding although the experiment has been completed, withdrawing the added incentive that participation in an experiment normally brings.—L. TWYFORD

■ TELEVISION

Dreher, Robert E., and Beatty, Walcott H.

An Experimental Study of College Instruction Using Broadcast Television: Project Number One, San Francisco State College, April 1958, 75 p.

Lepore, Albert R., and Wilson, Jack D.

Project Number Two (of the same study), San Francisco State College, Fall 1958, 77 p.

Purpose: To study the use of open-circuit television at home and on the campus for teaching college courses.

Procedure: Six courses were telecast over a commercial station permitting students to view the programs at home or in groups on the campus. Control groups were taught by the same instructors.

Results: Students who received instruction by television compared favorably with those receiving regular instruction. There were no differences with respect to self-insight, attitudes, and interest in subject matter, with the exception of the on-campus television group which had less interest and poorer attitudes. Eighty percent of the students who were enrolled in conventional classes but who also participated in television classes preferred the conventional ones. There were more effective and also more ineffective incidents in conventional than in televised instruction. Experience suggested that television should be placed within the administrative organization of the instructional area of the college. Under the existing conditions, it is feasible to offer a lecture-discussion course for 950 students and a more expensive course with a minimum of 1440 students. (These two reports contain much additional information not touched upon here.)—L. TWYFORD

■ FILMS

Noall, Matthew F., and Winget, Lerue

"The Physics Film Project"

Bulletin of the National Association of Secondary-School Principals 43:181-95; January 1959

Purpose: To determine whether it is possible to teach physics effectively with the Harvey White physics films even though instructors are inadequately prepared and laboratories ill equipped.

Procedure: Ten experimental and 10 control schools in Utah were used in the experiment. Achievement progress was measured with the *Cooperative Physics Test*. Interest was measured with the *Strong Vocational Interest Blank*. Large interschool differences prevented analysis using matched groups.

Results: No differences between experimental and control groups were obtained with large and small schools. Medium-sized schools showed a significant difference in favor of regular instruction. There were no differences in interests or drop-out rates between groups. There was some tendency for medium ability students to do better in the film course. Students and teachers responded positively on a questionnaire. It was concluded that physics can be taught effectively with the filmed course.

—L. TWYFORD

■ TRAINING AIDS

Horowitz, Milton W., and Fromer, Robert

A Set of Discriminable Surface Colors and Symbols for Coding in Animated Training Panels.

Technical Report NAVTRADEVCEN 20-OS-52. U.S. Naval Training Devices Center, Port Washington, N.Y. May 5, 1959. 19 p.

Purpose: To develop a color code and a symbol system for use on animated training panels for indicating the organizational and functional relationships among components and showing changes in the physical state of matter (for example, fuel) as it is burned.

Procedure: The procedure in this experiment included a literature study to evaluate earlier attempts, a preliminary choice of promising color and symbol codes, and laboratory testing of the preliminary choices against selected backgrounds. The laboratory procedure for color coding involved the discrimination of Landolt broken rings of various colors in four positions against 10 pre-selected background panels. The procedure for symbol coding involved the ranking of pairs of symbols presented in two spatial orders.

Results: The colors selected and the federal specification numbers were: red, 21136; orange, 22246; yellow, 23538; green, 24108; green-blue, 24325; blue, 25102; violet, 27144; white, 27886; gray (light), 26440; gray (dark) 26044. The symbols included diamonds, pyramids, dashes, squares, wavy line, straight line, large dots, and small dots.—L. TWYFORD

New DAVI Publications

Interaction in Learning: Implications for Television, 1959, 64 p., $1.

Opportunities for Learning: Guidelines for Television, March 1960, 80 p., $1.50.

What Do We Know About Teaching Modern Foreign Languages? September issue of AUDIOVISUAL INSTRUCTION, 50 cents per copy.

Teaching Machines and Programmed Learning: A Source Book, edited by Arthur A. Lumsdaine and Robert Glaser. Publication scheduled for May 1960, price, about $4.50.

The usual educational discount (10 percent on 2 to 10 copies and 20 percent on more than 10 copies) applies to all of the above publications. Please enclose money with orders of less than $1.

For information about the new book on teaching machines and for a list of other current publications, write to: Robert C. Snider, Director of Publications, Department of Audiovisual Instruction, National Education Association, 1201 Sixteenth St., N.W., Washington, D. C.

Deadline for Research Proposals

Proposals for communication media research under Title VII of the National Defense Education Act should be submitted on or before August 1, 1960 for consideration by the Advisory Committee at its fall meeting.

Proposals should be submitted to the Director, Educational Media Branch, Division of Statistics and Research Services, Office of Education, Department of Health, Education, and Welfare, Washington 25, D. C. Instructions for submission of proposals, including the preparation of applications, may be obtained upon request at the above address.